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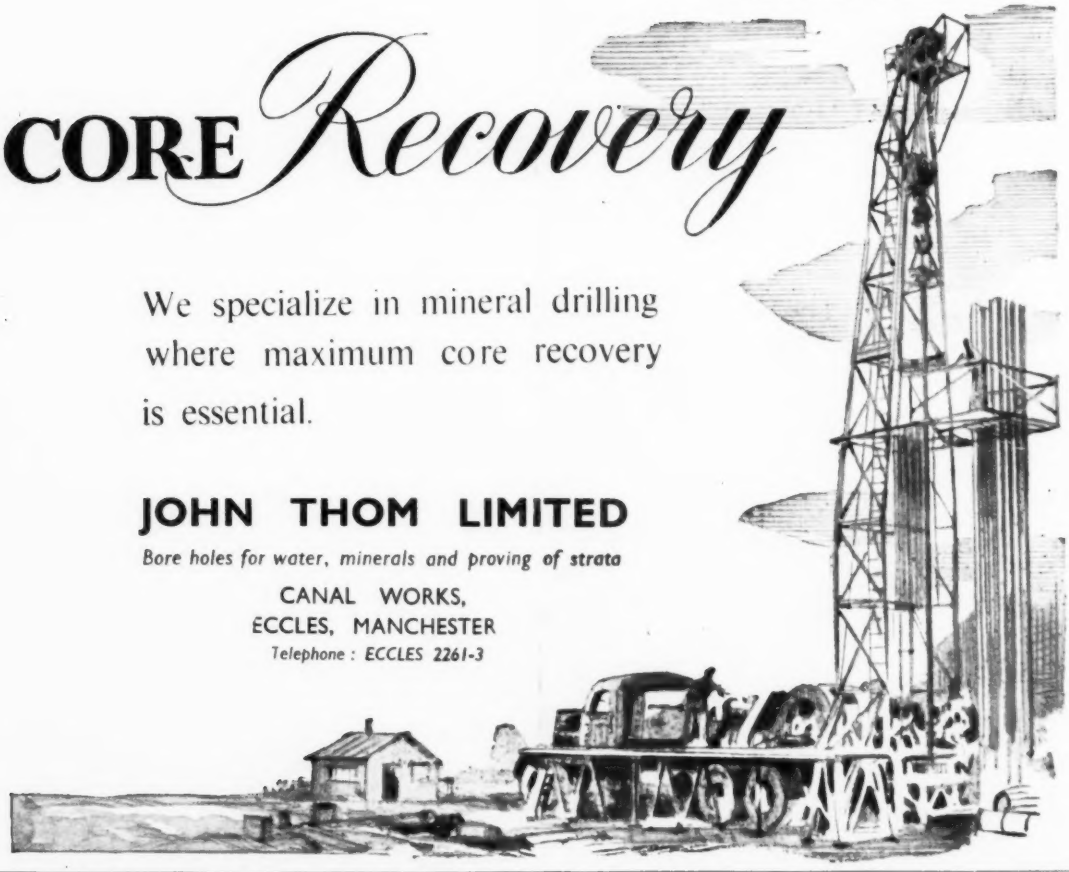

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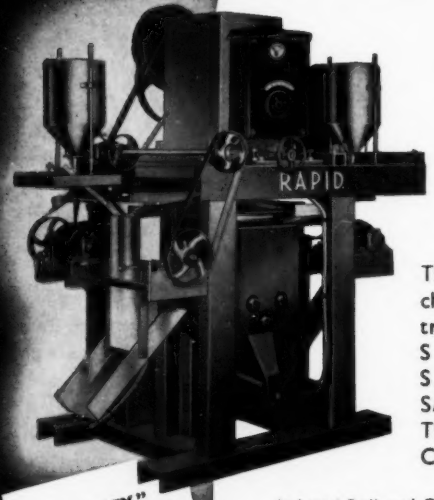

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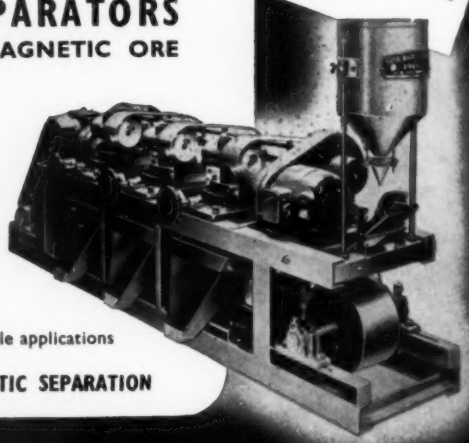

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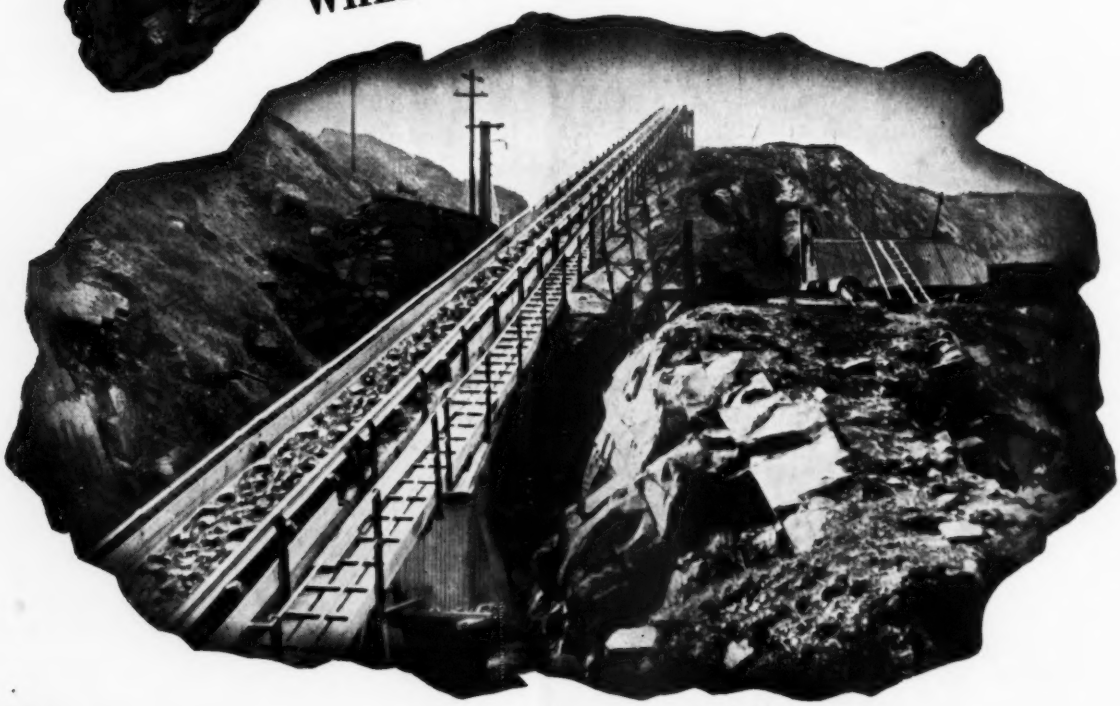

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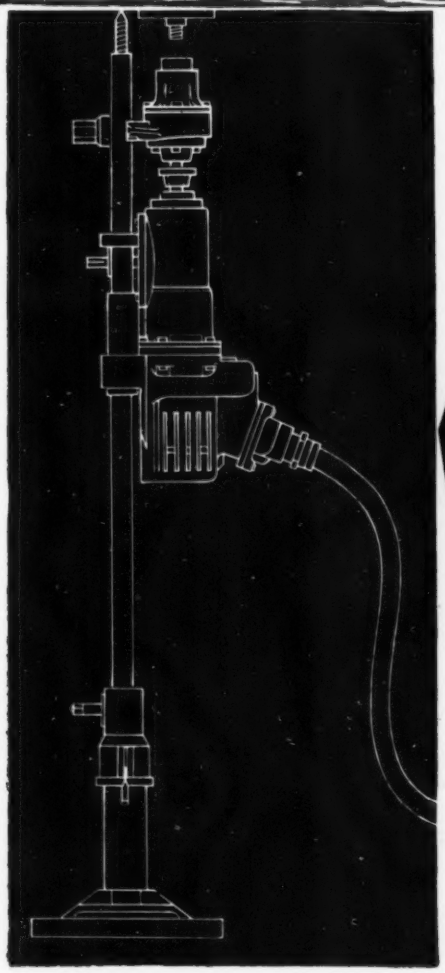

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HOW ATLAS COPCO EQUIPMENT HELPED FRANCE PRODUCE 57 MILLION TONS OF COAL IN 1955

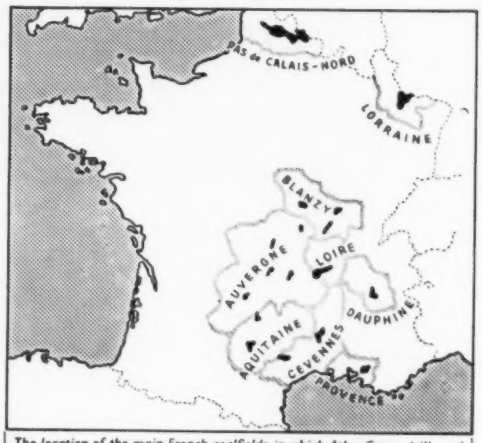
France today is one of the leading coal-producing countries in the world. The progressive modernisation policy of French mining authorities has created an industry that is one of the strongest links in the country's economy. With the introduction of new mining methods, production figures have risen year by year reaching fifty-seven million tons in 1955.

Over the last ten years France has started nineteen new mines and modernised many more. In these mines, productivity is the highest in Europe while output per man-shift saw an increase of 64% between 1948 and 1955.

GETTING AT THE COAL

The fifty-seven million tons of coal produced in 1955 entailed immense development work. It meant the drilling of 125 miles of galleries and the excavation of sixty million cubic feet of rock. With the use of fast and efficient drilling equipment on these preliminary operations, 1955's high production figure was achieved.

To speed development work, French mining engineers brought in the lightweight combination of pusher leg drills and tungsten-carbide-tipped drill steels—a drilling method pioneered by Atlas Copco and Sandvik in the early 'forties. At the present time four thousand of these light rock drills are in operation throughout the French coalfields. Many of them are *Atlas Copco* drills fitted with *Sandvik Coromant* steels.



The location of the main French coalfields in which Atlas Copco drills and Sandvik Coromant drill steels are extensively used

The Atlas Copco light rock drills and Sandvik Coromant tungsten-carbide-tipped steels in use down the mines were supplied by Atlas Copco France S.A., the French company in the world-wide Atlas Copco Group.

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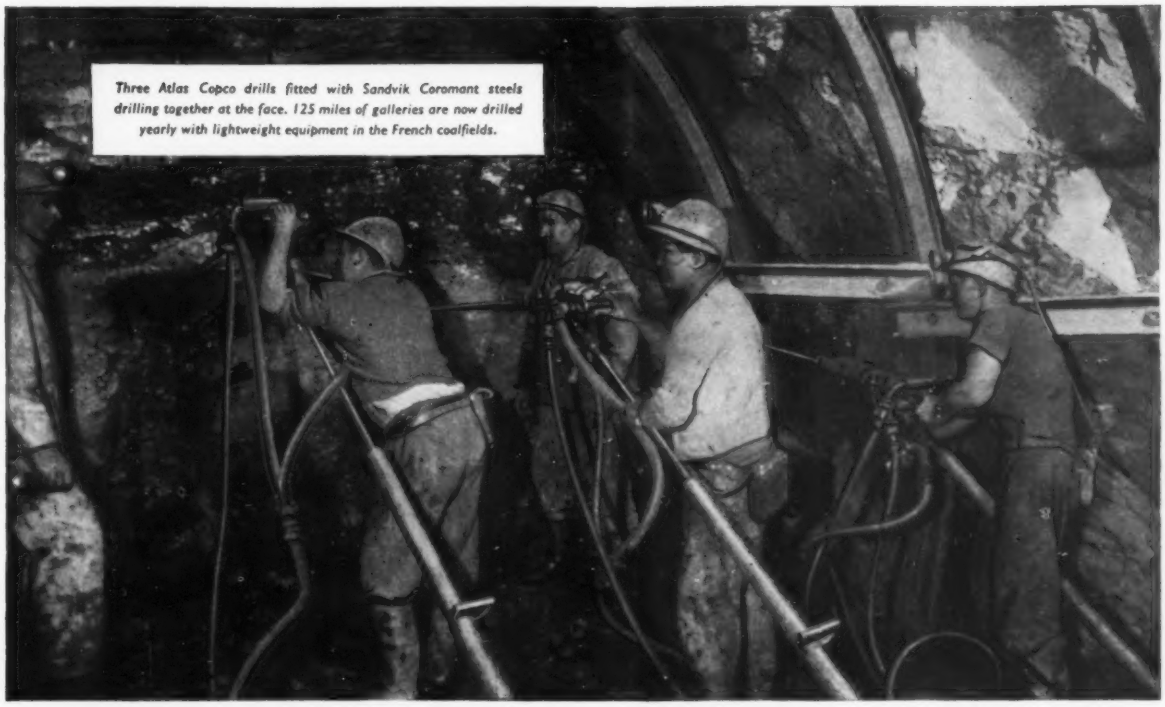
Atlas Copco rock drills on development work down a mine in the Nord-Pas de Calais area. By speeding up development work France was able to produce 57,000,000 tons of coal in 1955.



Three Atlas Copco drills fitted with Sandvik Coromant steels drilling together at the face. 125 miles of galleries are now drilled yearly with lightweight equipment in the French coalfields.

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Atlas Copco light, one-man rock drill in action at the Henin Liétard Mine. It is fitted with a Sandvik Coromant tungsten-carbide-tipped drill steel.

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NOTES AND COMMENTS

Mining and Industrial Development in Europe

Much progress has been made since the war towards the closer integration of Western Europe's economy through such organizations as O.E.E.C., the European Payments Union, and the European Coal and Steel Community. Among free nations, however, a co-ordinated approach towards problems of economic development can only be effected by mutual agreement through what can most suitably be termed enlightened self-interest.

In planning industrial development on a continental scale, more rapid results are likely to be achieved by an organization in a position to enforce its decisions regardless of national aspirations or prejudices. It is not surprising, therefore, that the Soviet bloc countries of Eastern Europe should have embarked upon a programme of economic integration which, at first sight, seems much more comprehensive and ambitious than has so far been attempted in the West.

A report from Berlin says that the member states of the Warsaw Pact have begun to carry out their joint decision to restrict economic development in each country to the most suitable industries, and to rely on imports for other items from the partner countries. East Germany, for example, will concentrate on the development of her brown coal industries. Emphasis will also be laid on the production of chemicals and coke from brown coal, the use of coke for the metal and chemical industries, and the development of artificial materials and fuels from brown coal. The East German metal industries will concentrate on the production of special high-quality steel, tubes, rolled steel and steel alloys, and will rely on imports of mass-produced steel and iron products. The chemical industry will concentrate on potash and fertilizer production and on the basic chemicals required by the entire bloc.

Poland and Czechoslovakia are expanding their hard coal production to the utmost, with accompanying improvements in the development of hard coal products and chemicals.

Hungary will concentrate on her aluminium industry, Rumania on oil and natural gas and the related chemical industries, Bulgaria on chemicals and non-ferrous metals, and Albania on chromite and other non-ferrous ores.

The programme is certainly logical and corresponds broadly to the existing distribution of the mining, metal and chemical industries, as, of course, it must. Presumably it does not preclude the continued development, for example, of Poland's huge zinc reserves or Czechoslovakia's antimony deposits, or the production of copper, silver and selenium in East Germany. In fact, the decisions made at Warsaw may well have done little more than recognize, and to some extent rationalize, a pattern of development which has been predetermined by such natural causes as population, racial aptitudes, and the distribution of known mineral resources.

It would appear that in both the Eastern and Western sectors of Europe, despite the radical differences in political conditions which influence the approach to economic problems, there is a growing awareness of the benefits to be gained by the co-ordination of industrial development in neighbouring countries, based on the most effective utilization of national resources. It remains to be seen whether, in the long run, the Warsaw Pact will prove more effective than the machinery for consultation and collaboration established by the Western nations, which has already proved by no means unsuccessful.

Minerals for Wheat and Butter

A revised directive covering procurement by the General Services Administration (GSA) of materials for the U.S. stockpiles of strategic metals, minerals and commodities has been announced by Mr. Arthur Flemming, Director of the Office of Defence Mobilization (ODM). It is applicable on stockpile purchases for the current financial year, which finishes on June 30, 1956.

The most notable feature of the amended directive is the emphasis placed on bartering U.S. surplus commodities

—wheat, rice, barley, oats, rye, maize, cotton, cheese and butter — for foreign-produced materials. This, of course, is no new development, for stockpiling has come to be regarded as a convenient method of disposing of the vast stocks of produce which continue to accumulate as a result of the present policy of support for agriculture, constituting perhaps the most difficult domestic problem with which the U.S. is currently faced. As recently reported in *The Mining Journal* (13/4/56, p. 444), in the last six months of 1955 the Commodity Credit Corporation bartered government-owned agricultural commodities for about $400,000 worth of strategic materials for transfer towards minimum objectives and about $16,000,000 worth for long-term objectives. The prominence accorded to barter in the new directive is a clear indication of the Government's anxiety to step up the rate of disposal to the fullest possible extent.

Unlike the Germans, who before the second world war were asked to choose between guns and butter—an invitation which, needless to say, was purely rhetorical—the Americans are apparently in the position of having so much agricultural produce that, if they could find sufficient buyers, they would be only too willing to exchange the surplus for the raw materials for guns—or ploughshares.

The directive recommended the following materials for procurement by barter or exchange of agricultural commodities for the national and supplemental stockpiles. Aluminium oxide, asbestos, bauxite, beryl ore, beryllium-copper master alloy, bismuth, cadmium, chromite, cobalt, graphite, iodine, lead, magnesium, manganese, mica, quartz crystals, shellac, silicon carbide, talc and zinc. Uncle Sam is prepared, if necessary, to pay for these materials in almighty dollars, but he would much rather, it seems, pay in cheese or butter!

While stockpiling provides a perplexed Government with a convenient method of disposing of the agricultural produce which, for political reasons, it is compelled to buy, it is indeed incongruous that the country holding the largest gold reserves in the world should be seeking to procure its requirements of strategic materials by means of barter. The exchange of cereals for chrome or manganese is a method of doing business which doubtless is not unattractive from the standpoint of countries in urgent need of wheat or barley. The long-term interests of such countries might be better served, however, if the minerals exported were sold in the usual way for dollars which could be converted into machinery to be used in growing more food.

The amounts so far involved in the U.S. barter transactions are too small to have any perceptible effect on metal markets and prices, though it is conceivable that by hastening the completion of existing programmes, procurement by barter might precipitate the suspension of U.S. government purchases for stockpiling purposes—which, in any event, must come to an end sooner or later. A more serious objection is that inevitably the example set by the U.S. government is being widely followed, with the result that barter agreements are already becoming a recognized feature of international commerce. This must tend to disrupt the flow of trade by cutting into the markets normally available for the established suppliers of the commodities covered by barter agreements. Ethical considerations apart, it seems reasonable to believe that the world's commerce can be handled more cheaply and efficiently by experienced traders than by bulk exchanges effected through the medium of government officials. The growing tendency towards barter cannot, therefore, be viewed without some apprehension, even if the implications cannot as yet be clearly foreseen.

South Africa

(From Our Own Correspondent)

Johannesburg, May 12.

Although in the Stock Exchange world, both here and in London, mining shares have made a sorry showing during the past month, in the field of mining itself there have been some interesting developments. The first is that Doornfontein G.M. beat its own tunnelling record during April by driving a total of 1,962 feet—1,903 ft. straight and 59 ft. in service chambers — compared with 1,508 ft. for 26 days in March. Roan Antelope claims a greater footage.

THE URANIUM CURTAIN

A development which may prove to be of major importance is the decision of the South African authorities to revise the uranium secrecy position. Apart from the Atomic Energy Act, which laid down that nothing could be published about uranium without a written certificate, an involved security system had been created on the mines themselves. The *South African Mining and Engineering Journal*, which has been fighting this issue for some time, has described it in a leader as a "comic opera concentration camp concept with high barbed wire fences and expensive guards!" It now looks as if the "U" plants will be on the same basis as gold reduction plants—"No Unauthorized Persons Admitted". There are no signs of any relaxation, however, on the questions of grade, ore reserves or price.

POSITION OF THE OLDER MINES

From time to time your correspondent has referred to the struggle the older lower-grade gold mines have to keep their heads above water in the light of a fixed gold price and the apparently never-ending rise in working costs. Exactly how bad things are has been brought home by the various speeches and annual reviews published of late. A further blow is the increased contribution required to finance the higher silicosis benefits now before Parliament. Admittedly the Government is to shoulder the cost of retrospective payments amounting to some £9,500,000 in a lump sum, leaving an additional £500,000 a year to be paid for by the mines. Regrettably, the amount payable by a mine is roughly in inverse proportion to remaining life, so that it is the older and poorer mine that bears the heaviest burden. A typical example is Modder B, which is in the last stages of its life. Last year it showed a working profit of £31,600, but this year it has to pay £4,000 in increased contributions.

As a precautionary measure, the mines have been charging the money required to working costs since the start of the year and this policy is undoubtedly in part responsible for the depressing showing of Rand producers in the statistics of operations for the first three months. As compared with the position 12 months previously, the number of older mines producing gold which are earning less than 3s. a ton has risen from 12 to 16. Some of the percentage drops in working profits border on the alarming. The following are a few examples: City Deep 45, Cons. Main Reef 34, Crown Mines 23, Geduld 44, Government Areas 47, Modder East 73, Rand Leases 70, Robinson Deep 44.

It is little wonder that there is growing concern as to what is to happen to these older properties. It is being suggested more strongly than ever that something will have to be sought on the mining side, since hopes of a higher gold price are dwindling and, in spite of various declarations to the contrary, the prospects of an end to inflation—either internally, externally or both — are anything but bright. One important consideration is that it seems illogical to attempt to maintain high milling rates in the face of declining ore reserves and a chronic shortage of labour.

The Coal Industry

(From Our Own Correspondent)

In Britain total coal output this year to date is now running some 500,000 tons above the level reached in the corresponding period of last year, this being due to increased opencast production and the fact that strikes so far this year have cost the industry 750,000 tons less. However, disputes and restrictive practices continue to take a serious toll of production, particularly in South Wales. The current trouble in this area springs chiefly from resentment by the faceworkers at the narrowing of their differentials over day wage workers. Some time ago the protracted troubles at Brynhenllys Colliery precipitated its closure, but this discliplinary action by the Coal Board apparently has not proved a sufficient deterrent to "go slow" miners in other South Wales pits.

Perhaps foreshadowing a tougher policy the Coal Board recently issued dismissal notices to 1,065 men at two anthracite mines for what is officially described as "continued restriction of effort, lack of co-operation and low output, resulting in serious financial loss". Both these mines have a shocking record. There were 47 disputes or go-slows at these pits last year and a further 11 so far this year. The pits have been on strike since April 24 in support of two men sacked for persistent restrictive working. In the Neath area of the South-Western Division the mines last year lost 32s. per ton, amounting to almost £3,500,000. At the two pits concerned losses last year amounted to £405,000.

With few dissentients Trade Union opinion is that strong disciplinary measures were called for, and indeed the men concerned have not got the sympathy of their leaders, who are exhorting them to further efforts in an attempt to achieve withdrawal of dismissal notices.

CAN WE USE MORE COMMONWEALTH COAL?

In the Commons the big news recently has been the revolt of 22 Tory M.P's who divided their Whips and forced a division on a Bill to add £350,000,000 to the National Coal Board's borrowing powers. Not unnaturally the Socialists abstained from voting. The Leader of the Tory back benchers who opposed the Bill, moved its rejection on the grounds that it extends the ability of the Coal Board to borrow without adequate parliamentary control. He went on to make an appeal for the exploitation of coal resources in Tanganyika, Southern Rhodesia and Southern Nigeria. In answer, the Minister of Fuel and Power indicated that the possibility of substituting British coal for Commonwealth coal has been under consideration for some time.

EUROPEAN IMPORTS UP

Following a joint meeting held recently by the High Authority of the European Coal and Steel Community and the Coal Committee of the Organization for European Economic Co-operation it was predicted that in the current quarter the countries of Europe would have to import about 800,000 tons of coal more than had been forecast earlier. Total imports for the April/June period are now estimated at 7,300,000 tons, some 6,000,000 of which will come from the United States. E.C.S.C. exports to non-member countries are likely to be maintained at the first quarter level of 1,900,000 tons per month.

The president of the French Steel Producers Association said recently that France must insist on the right to exploit the Warndt coal mines in the Saar and a canalization of the Moselle River, and if agreement with Germany on these points cannot be reached during negotiations on the future of the Saar he said that France should withdraw from the European coal and steel pool. However, it seems unlikely that Germany will give up the Saar, and so trouble may well be on the horizon.

THE FAR EAST

A compromise settlement has been reached between Japanese colliery owners and the striking miners. Following this agreement, the owners immediately called off a 43-day lockout which involved 16,000 miners. The strike ended only a few hours before another 43,000 workers at other coal mines were scheduled to begin a two-day sympathy strike.

The miners at the Miike coal mine in Kyushu agreed to return to work after the management offered them a loan equivalent to 80 per cent of total wages lost during the strike. The loan was offered on condition that the miners made up for the loss in production. According to company officials, the Miike mine lost about 330,000 tons of coal as a result of the strike, while the miners lost about 300,000,000 yen in wages.

From Australia comes news that the coal mining industry is facing a number of problems in meeting the challenge of other sources of heat and power, principally oil. Industrial use of brown coal has also greatly expanded, and gas to be produced at the field and piped to users will largely supplant the need of gas-making coals in Victoria from the major fields in New South Wales. Some N.S.W. mines have been closed, and in others production reduced. There has been a slight falling off in the labour force employed in the coal mines.

These present difficulties are largely of the miners' own making as it is only some 18 months ago that the Miners' Federation belatedly withdrew their opposition to mechanization. Had higher productivity been achieved sooner, coal users would no doubt have been less concerned about seeking alternative fuel. However, unrest in the Australian coal mining industry is not so evident as of recent years, and output per man shift is rising, bringing about a consequent reduction in pithead price of coal. One cannot help but feel, however, that this progressive step has been taken too late.

In New Zealand a report recently issued by the Department of Scientific and Industrial research indicates that large savings of money and fuel would result if Waikato coal was completely gasified instead of being used to produce steam for the generation of electricity. Commenting upon this report of the D.S.I.R. the general manager of the Auckland Gas Company pointed out that gasification would prove economic only if the plant produced 20,000,000 cu. ft. a day — nearly five times the combined consumption of Auckland and Hamilton. The cost of a plant having a 20,000,000 cu. ft. capacity would be some £5,000,000.

AMERICAN PROSPECTS

The secretary of the Department of the Interior recently stated that his department would continue to champion policies under which the development of coal and other natural resources may proceed within the framework of free enterprise. Atomic energy will not make coal mining a secondary industry, and indeed coal within the foreseeable future promises as much, or more, than any other source of energy.

American coal enjoys the primary advantage that it is so abundant. So vast are natural resources that less than 3 per cent of known recoverable reserves have been mined. Even the anthracite industry, which for a long time has been in the doldrums, is picking up, and recent returns indicate that, for the first time in years, demand ran ahead of production.

Potentialities of the Bethal Goldfield

Some two years ago, a note in *The Mining Journal* of February 19, 1954, indicated that South African mining engineers were turning their attention to the potentialities of the reef formation existing between the towns of Leslie and Carolina in the Eastern Transvaal area, and in December last year Winkelhaak Mines Ltd. was formed under the aegis of Union Corporation to exploit a mining lease totalling some 5,115 claims in the now well-known Bethal district. In the following article our South African correspondent describes the impressive potentialities of the Bethal Goldfield, giving some indication of the possible future expansion of the district.

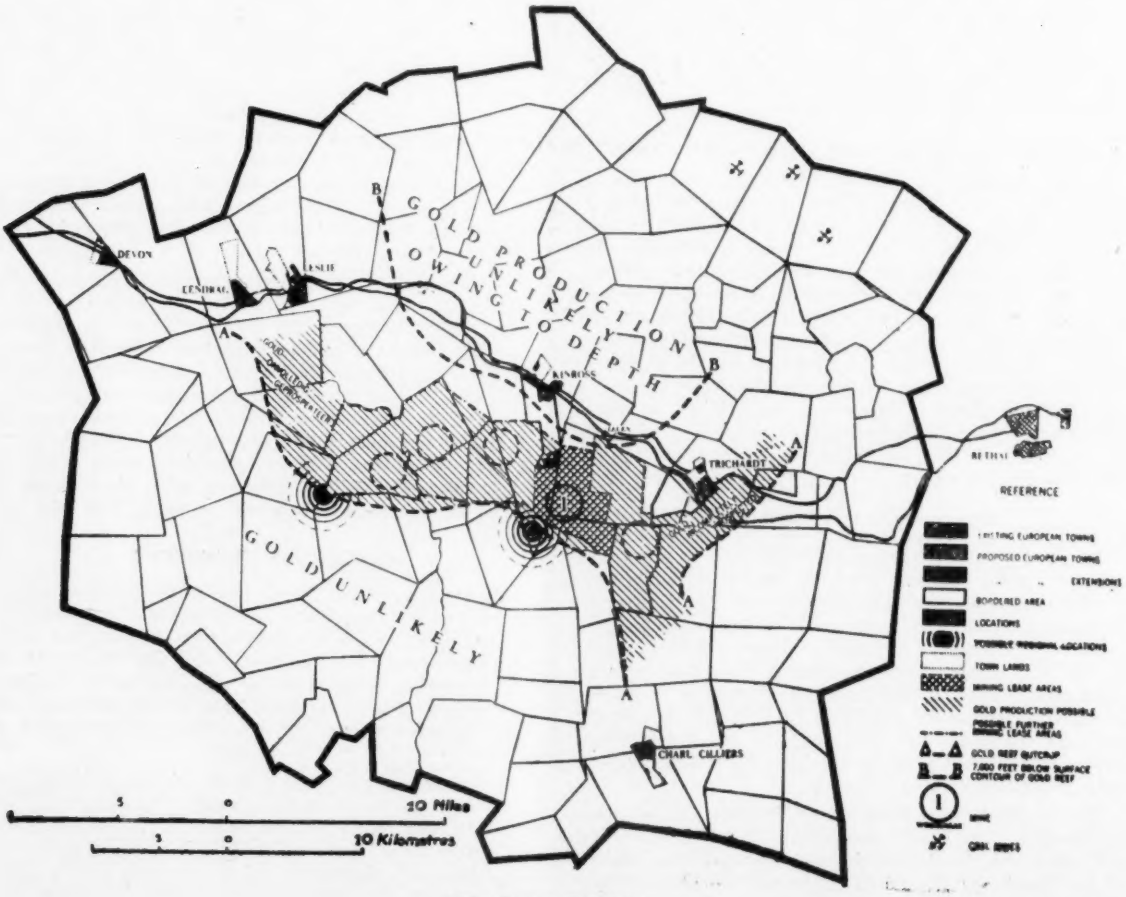
The latest annual report of the Union Corporation makes mention of the possibility of another two mines in addition to Winkelhaak being opened up in the Bethal area. Almost simultaneously with its release came the publication of a regional survey of the area by the Natural Resources Development Council, a Government body which plays a major part in planning new mining areas as well as assisting in the development of various regions. It bases its survey on the prospect of at least another four mines in this area, having regard only to what is known already and not taking into account the work of mining organizations other than Union Corporation nor of any further evidence that may come to light in additional exploratory work. It will be seen from the map that, although apparent limits to the north and south are indicated, the easterly and westerly wings are still indefinite. It is understood that a fair amount of work is in progress towards the town of Charl Cilliers, but nothing definite has emerged as yet.

The area delineated on the map has been declared a Controlled Area with the aim of ensuring that future development will take place in the best possible way. Preliminary estimates place the population of the new mining area at 27,500 Europeans by 1970, together with 95,000 Africans. These figures may be on the conservative side in the light of the rapid progress being made at Winkelhaak, which according to the present indications might well come to the production stage much earlier than was estimated in the original prospectus.

The Council reports that in addition to gold in the ground demarcated, the whole area is underlain by coal seams at between 200 and 700 ft. The coal is low-grade but suitable for power generation on the spot and possibly for the production of fuel oil and chemicals.

In the light of the Council's observations it would appear that Kinross will be the main town in the area, though a limit may be placed on its potential development by available water supplies.

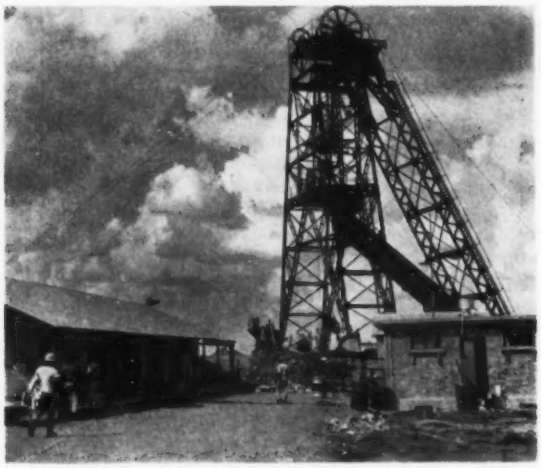
As for the mines themselves, there should be sufficient water available locally for operations in the early stages.

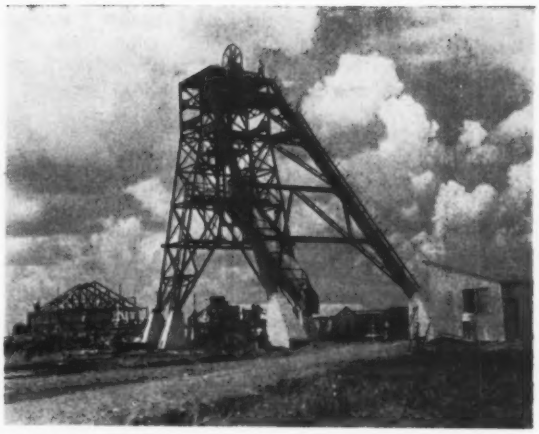


The Bethal Goldfield

Application has been made to draw water from the Vaal River in due course, but the Union Corporation has decided to postpone utilizing this source for the present until the cost can be spread more widely.

It will be recalled that from the drilling programme carried out by Capital Mining Areas—a wholly-owned subsidiary of Union Corporation—during the years 1950-1955, it would appear that the Kimberley Reef is the only economic horizon in the area. Indeed, eight of the boreholes put down were continued to the Main Reef horizon





(At left) : The headgear at No. 3 Shaft, Winkelhaak Mines, on the farm Kaffërskraal; (Above) The headgear at No. 1 Shaft, Winkelhaak Mines, on the farm Winkelhaak

but failed to yield payable values. While on examination the reef was reported not to carry payable uranium values, it nevertheless is wide, averaging 26 in. width, and should permit easy and economical mining conditions. These operations can be assisted by the use of scrapers because of the 25 deg. dip.

NUCLEAR ENERGY IN MINING—III

Aspects of Nuclear Reactor Usage

The following article discusses relevant aspects of nuclear reactor usage, with reference to the various possible fuel materials. The article is the conclusion of three instalments devoted to a survey of the raw materials of atomic power development, and is part of a careful analysis of the disclosures made to an international conference on the peaceful uses of atomic energy held at the European Headquarters of the United Nations in Geneva during August 8 to 20, 1955.

Uranium metal can be cast or rolled to a variety of shapes without difficulty and is also amenable to powder metallurgy techniques. In reactors it is used in sheet form, in cylindrical slugs and as tubes. A type of element which has found great favour in the U.S.A. consists of a lattice built up of a number of uranium sheets 24 in. x 3 in. and 0.06 in. thick curved on a 5½ in. radius to give a troughed appearance. Cylindrical slugs of uranium have been used from 1 in. to 6 in. dia. and up to 10 ft. in length.

FUEL ELEMENTS

In a reactor the fuel element is subject to severe stresses caused by the isotopic changes in the fuel and the high temperatures which are reached. At these high temperatures uranium has poor load bearing characteristics and is subject to physical deformation which can cause complete disruption of the fuel element.

The most direct method of overcoming these problems is to alloy the uranium with other elements which will accommodate the strains involved. Uranium forms a number of compounds and solid solutions with other elements amongst which beryllium, magnesium, zirconium and niobium can be used in thermal reactors whilst molybdenum in low concentration may offer the required properties without impairing the efficiency of the reactor on account of its high neutron capture cross-section.

CANNING ELEMENTS

A further method of strengthening the uranium fuel elements in a reactor is to sheath the uranium in a " can " of stronger metal. Besides satisfactory mechanical properties the metal selected must exhibit a low neutron capture cross-section if it is not to reduce reactor efficiency. When all the factors have been considered the most satisfactory canning materials are found to be beryllium, zirconium, magnesium, aluminium, molybdenum and niobium, and stainless steel.

None of these metals exhibits all the desired qualities and to date aluminium cans have been used in about 20 of the reactors so far constructed. Stainless steel has been used in three or four instances and magnesium and zirconium have each been tried. Beryllium, although the most suitable choice, has yet to be used in reactor construction. This is because beryllium is in short supply and the necessary fabrication techniques have had to be developed. The production of beryllium has now been undertaken by two companies in the United Kingdom and descriptions of the techniques employed were given at the recent Symposium

on Extraction Metallurgy of the Less Common Elements held by the Institution of Mining and Metallurgy. It may be anticipated that beryllium will be mentioned with increasing frequency as a reactor construction material.

REACTOR COOLANTS

Carbon dioixde, water and heavy water have been used for cooling reactors. Air is unsuitable because its nitrogen content has a high neutron absorption and helium has the disadvantage of high cost. The use of hydrogen presents serious difficulties. Ordinary water cannot be present to a large extent without impairing efficiency of operation, and the final choice for Britain lay between gas or heavy water cooling. Heavy water is also subject to the disadvantages of high cost and dependence on overseas supply and the recent abandonment of the heavy water production project in New Zealand would seem to indicate that other coolants will find more general use.

Liquid-metal cooled reactors are also feasible and here the choice is strongly in favour of sodium-potassium alloys as opposed to alternative metals such as lithium, gallium, bismuth and lead.

SUITABLE MODERATORS

The moderators having the best nuclear properties are water, heavy water, graphite, beryllium and beryllium oxide. Of these, heavy water is the best, but it is expensive and dissociates under radiation. Water, on account of its fairly high cross section, is suitable only for enriched reactors.

Beryllium and beryllium oxide are two good moderators which are only coming into use for reactor construction now that the supply situation is easing and fabrication difficulties are being overcome.

Reactors are controlled by the insertion into the core of rods of high neutron absorption. For the construction of control rods cadmium and boron are most favoured, and nearly all reactors built to date use either of these two metals. Cadmium is used clad in aluminium or steel and boron is used as boron-steel or boron carbide. One American reactor uses boron trifluoride sealed in an aluminium tube and hafnium has also been used in reactor control.

ASPECTS OF SHIELDING

The shielding of reactors has to perform a number of functions and no one material fulfils all requirements. Besides the various radiations which form a biological hazard to reactor operators, the heat energy emitted must also be removed. Cast iron and steel have often been used for thermal shielding and complex shields of lead, aluminium, steel and plastic have been tried.

The cheapest and, in most cases, the most satisfactory shielding material is concrete however, and the trend seems to be away from multi-layer shields of different materials towards the use of high density concrete. Heavy concrete has been made using iron oxide or steel punchings in place of the normal aggregate, but the most satisfactory type is barytes concrete in which barytes replaces the coarse and fine aggregate of ordinary concrete.

FAST REACTOR CONSTRUCTION

Something of the order of 60 thermal reactors have been constructed throughout the world and details made available from which the trends in the use of different construction materials distinguished in preceding paragraphs have been made. Details of only half a dozen fast reactors are available, however, and in view of the considerable period that will elapse before reactors of this type are in common use, it is proposed to deal only briefly with the different construction materials that will be required.

The fast reactor has no moderator and the high heat ratings demand a liquid metal coolant. For this purpose sodium-potassium alloys are most suitable, and as few structural metals form solid solutions with them, and because low absorption cross-section is not essential, the choice of canning material for the fuel elements is considerably wider than with the thermal reactor. Possible materials include tungsten, tantalum, titanium, niobium, zirconium, and molybdenum whilst nickel and vanadium are suitable for lower temperature conditions.

Control of fast reactors is much more difficult than with thermal reactors and natural uranium control rods have found favour to date.

THORIUM IN REACTOR CONSTRUCTION

Reactors of the Dounreay type will eventually be operated on the plutonium-thorium fuel system in which U-233 is bred from the thorium. Higher enrichment of the fuel is required in a fast reactor and the levels of thermal and nuclear radiation are higher than in thermal reactors. The stage has not yet been reached at which it is possible to predict the behaviour of common structural metals with any degree of safety under the new conditions of use created by the construction of reactors and the more rigorous these conditions become as reactor designs develop the greater research effort required at each stage of development. The problem is intensified by the introduction into reactor design of materials formerly in short supply and hitherto neglected as engineering materials. The present status of knowledge is illustrated by the safety precautions embodied in the design (and siting), of the Dounreay reactor.

The use of thorium in reactors is not expected to greatly affect the choice of materials and thorium itself can be extracted, purified and worked using techniques similar to those applied in the case of uranium although the presence of rare earths in thorium minerals presents some difficulties. Thorium possesses physical properties in general superior to those of uranium, and it can be worked and alloyed without particular difficulty. For structural use in fast reactors tungsten and tantalum have desirable qualities if the fuel is to be canned whilst titanium, niobium and vanadium are other runners in this field.

FURTHER POSSIBILITIES

The possible development of liquid reactor fuels using plutonium-manganese or plutonium-nickel systems deserves only passing mention in a review of this kind whilst systems where uranium is circulated suspended in a "slurry" with lead, tin or bismuth, whilst proposed, offer only speculative grounds for the inclusion of these base metals as possible raw materials for atomic fuel element construction.

This survey of atomic energy developments would be incomplete without reference to the use of thermonuclear reactions for power generation. Sir John Cockroft revealed at Geneva that research into this possibility is being conducted in Britain and the possible control of the enormous energy released in fission reactions must overshadow all thoughts for the future of atomic power. The material needs of this advanced stage in the harnessing of new power sources cannot be predicted, however, and despite vigorous discussion at Geneva and elsewhere, no one has yet liked to put a date to its advent.

The difficulties may well be insuperable, but any substantial increase in the price of uranium would be a strong economic incentive to research aimed at overcoming them. Should success be achieved, it is apparently to the oceans of the world we shall look for fuel, and not to the mining industry.

Steel Around The World

(From Our Iron and Steel Correspondent)

Restriction of demand is the normal economic reaction to higher prices, but there is a complete lack of evidence that the slight reversal of the rising trend of British steel production is due to the recent price changes authorized by the Iron and Steel Board. These advances fall considerably short of the increase in production costs, profit margins are substantially less than they were a year ago, and although there have been changes in the pattern of consumer requirements, overall deliveries and demand have increased more rapidly than production capacity. A detailed analysis shows that although there has been a slight decline in specifications from the motor and cycle industries, deliveries of steel plate to the ship builders and wagon builders and of all types of structural steel, ferro concrete bars and wire rods have risen to the absolute limits of capacity.

Corresponding conditions have developed in Western Europe and in America. Prices have advanced in both areas and it is manifest that much steeper rises will be entailed in the U.S. if the new wage programme which has been drafted by the United Steel users of America is conceded either wholly or in part.

The adoption of an inflated price scale was the sequel to the workers' pay increase of 15 c. an hour last Summer, and demands for the new agreement which must be negotiated before June 30, are on a much more ambitious scale, including as they do higher pay, widespread changes in incentive rates, a guaranteed annual wage, more holidays, triple pay for holiday working and improved welfare conditions. A U.S. steel strike would be an unmitigated disaster but it is not necessarily discounted because of its calamitous consequences and there appears to have been some stockpiling as a precautionary measure.

EUROPEAN PRODUCTION

In this country and in the area of the European Coal and Steel Community, steel production suffered a slight shrinkage in April. Compared with the peak figure for March the weekly output of crude steel in April was reduced by 4,700 tons, whilst in the seven constituent states of the E.C.S.C. production for the month declared from 4,838,000 tons to 4, 575,000 tons.

In neither case was the decline due to any lack of demand. Shortages still abound, and ship builders are apprehensive that they may not be able to adhere to promised delivery dates because of inadequate deliveries of steel plate. Requirements of the engineering trades are equally heavy. The Government is pursuing a fixed policy of transferring demand from consumer goods to capital investment works, and the continued prosperity of British steel is cushioned by expensive imports which the industry would gladly see reduced.

AVAILABILITY OF ORES AND SCRAP

The halt in the rising trend of production both in this country and abroad is in some degree attributable to the disturbing shrinkage in the available supplies of raw materials, more particularly iron ore scrap. Heavy imports of coal and steel have imposed a severe strain upon sea freight capacity. Freight rates have advanced to a post-Korean peak, and the difficulty of chartering ore carriers is reflected in a sharp decline in the arrivals of foreign ores. It is no longer probable that the British target figure of 14,000,000 tons of imported ores will be reached this year although arrangements are now in hand to accelerate deliveries in anticipation of the completion of several new blast furnaces which are due to come into operation in the late Summer. Meanwhile shortages of pig iron are only partially overcome by substantial imports from Western Europe and Soviet Russia, and both the steel works and foundries are working on narrow stock margins.

SOME CURRENT DEVELOPMENT PROGRAMMES

In all the principal steel producing countries expansion of capacity is placed foremost amongst the immediate objectives, and the smaller states are also seeking at least a partial emancipation from their dependence upon steel supplies from abroad. India's plan to build three new steel plants each with a rated capacity of 1,000,000 tons a year has been given urgent priority and ranks as a major contribution to the industrialization of the leading Asian country. In the terms of the three contracts placed respectively with Russian, German and British interest there are notable differences.

The agreement with the U.S.S.R. for the building of a structural steel plant at Bilhai provides for the supply of equipment by the Soviet Union but the constructional work will be undertaken by the Government of India under the guidance of Russian specialists. Similarly the tasks of site development and construction of the flat products plant at Rourkela will be a responsibility of the Hindustan Steel Company a government sponsored enterprise, the German Krupp-Demag group providing the plant and the expert know-how. On the other hand, the British consortium has undertaken to build at Durgapur and hand over in a state of completion an entirely integrated plant—consisting of blast furnaces and mills for the rolling of medium structurals, blooms and billets for forging and re-rolling and railway wheels, tyres, axles, and sleepers.

The 3,000,000 tons of ingots from these Government owned plants due for completion in 1961 will be supplemented by an approximately equal tonnage produced by the Tata Iron and Steel Co. Ltd. and the Indian Iron and Steel Co. Ltd. to which end the former of the two companies has already embarked on a project for adding some 750,000 tons to its present capacity. Obviously these vast industrial developments, which are regarded in New Delhi as merely the first stage in a still more ambitious programme will necessitate considerable extensions of the facilities afforded by the country's ports and railways and this is a matter which is receiving immediate attention.

The decision of Siderugia Nacional, the Portuguese steel company, to go forward with the construction of an iron making plant and steel mill in Northern Portugal has yet to receive the approval of the Lisbon Government but there is already keen competition amongst various groups for the contract. It is stated in Lisbon that of the four companies in the running two are German, one British and one French and it may well be that the extent of the long term credits offered, will be a material factor in determining the final approval of the contract.

With the assurance of a sellers market, and a large unsatisfied demand, and opportunities for the further expansion of the export trade, British steel companies are pressing on towards the completion of the second development plan, and as already announced the Steel Company of Wales has obtained the approval of the Iron and Steel Holding and Realization Agency for further developments at Port Talbot designed to increase the output of steel ingots from 2,400,000 to 3,000,000 tons p.a. by 1960.

Mining Expansion in Yugoslavia

By BRANKO DJUKIC

It will be recalled that in our issue of February 24, 1956, the editor of *Rudar*, Belgrade, reviewed the progress of the development of a non-ferrous metal industry in Yugoslavia based on indigenous resources. The following review is based on an article specially contributed to *The Mining Journal* by the same author, which gives a wider picture of current expansion within the Yugoslav mining industry. The article has been supplemented from other sources, mainly official.

Notable progress was made by Yugoslavia's mining and metal industries in 1955 and there are indications that the tempo of expansion may be still more rapid during the coming year.

Coal mines produced over 15,200,000 tonnes of hard coal and anthracite, exceeding the amount called for under the national economy plan by more than 200,000 tons and being about 1,600,000 tonnes higher than the output in 1954. Particularly noteworthy was the increase in anthracite production, which amounted to about 900,000 tonnes. This improvement was achieved by expanding the capacities of the Kreka, Kolubara, Kakanj and Kosovo mines, whose reserves are among the largest in the Balkan States.

The expansion of coal production created favourable conditions for many other industries. The output of coke, at 730,000 tonnes, was more than double the total for the previous year, while that of steel rose to about 800,000 tonnes, an increase of approximately 200,000 tonnes. The higher steel production was attributed to the expansion of existing plants and the commissioning of new plants in Yugoslavia's largest steelworks at Zenica. Iron ore production at over 1,350,000 tonnes was also 200,000 tonnes higher than in 1954.

BASE METALS OUTPUT

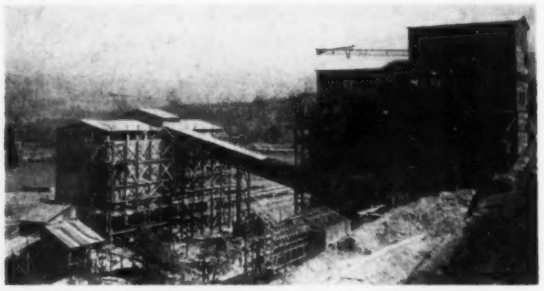
In a review of non-ferrous metal developments in Yugoslavia since the end of the war, the Chamber of Foreign Commerce in Belgrade stresses the rapid expansion that has taken place in the country's known reserves of ores.

Notable results were achieved last year in prospecting for lead and zinc ores at Kisnica near Ajvalija, at Srebrenici in Bosnia, and in the region of Eastern Macedonia. The ores have a lead and zinc metal content of 6 to 15 per cent. In addition, they contain significant quantities of silver and other associated metals. The production of refined lead rose last year to 75,612 tonnes from 66,729 tonnes in 1955 and compares with 69,120 tonnes in 1939. That of zinc concentrates has been expanded to 77,996 tonnes in 1955 from 71,386 tonnes in 1953 and 56,099 tonnes in 1939. These advances have been made possible by the opening of new lead and zinc mines such as these at Veliki Majdan, Lece, Ajvalija, Janjevo, Novo Brdo, and Suplja Stijena.

The production of crude copper, amounting in 1955 to 28,620 tonnes, is still considerably below pre-war levels, the figure for 1939 being 41,643 tonnes.

Though Yugoslavia is a major European producer of copper, the entire production comes from the Bor Mine in Eastern Serbia, owned by a French company before the war. Large deposits of ore exist in the Majdanpek area north of Bor and south of the Danube. The idea of exploiting Majdanpek has been under discussion for a considerable time, since the ore reserves of Bor are limited. Under existing plans, Majdanpek could produce 23,000 tonnes of blister copper yearly, which together with the Bor output would bring Yugoslavia's total annual production to 55,000 tonnes.

In 1953, a Japanese expert, Mr. Hidesaburo Kurushima, of the Dowa Mining Company, visited Majdanpek and made a report to the United Nations Technical Assistance Board on the possibilities of working the deposits.



New plant for separating coal at the Kakanj mine, Bosnia

Recently it was reported from a source described as "usually reliable" that the Soviet Union had offered Yugoslavia economic aid to exploit the Majdanpek deposits. According to the same source, France with U.S. backing had already offered to supply mining machinery and plant on credit, the rate of interest being five per cent. Yugoslavia would make repayment over a period of five years in copper produced from the mine. The conditions offered by the U.S.S.R. were said to be more favourable, one of them being that repayment need not be exclusively in copper from Majdanpek but could also be in other commodities to be agreed upon later. It was considered probable that the Russian credit offer carried the usual credit terms of a 2 per cent interest rate and repayment over ten years. Yugoslavia has already signed agreements with the Soviet Union this year for economic credits totalling the equivalent of $194,000,000.

ALUMINIUM FROM INDIGENOUS MATERIALS

The alumina and aluminium works at Kidricevo near Ptuj in Slovenia came into operation late in 1954 and its production last year reached 33,910 tons of alumina and 8,243 tons of aluminium. In 1956, this factory will be able to produce over 12,000 tons of aluminium and nearly 40,000 tons of alumina. Yugoslavia's total production of alumina and aluminium in 1955 amounted to 44,970 tons and 11,499 tons respectively.

For the production of aluminium, Kidricevo uses raw materials which are mainly of domestic origin—bauxite from Istria, Dalmatia and Bosnia; coal from Slovenia, and electric power from the hydro power stations on the Drava River.

Since the output of alumina at present exceeds domestic requirements for the production of aluminium, the surplus is exported. It contains an average of 0.02 per cent SiO_2, 0.04 per cent Fe_2O_3, 0.005 per cent TiO_2, 0.3 per cent Na_2O, and 0.5 per cent moisture.

The first stage of production capacity of the Kidricevo plant, amounting to 50,000 tons of alumina and 15,000 tons of aluminium, will be completed this year. Prospects for further expansion of this important factory are regarded as very favourable, not only because the equipment for additional capacity has already been secured, but also because of the steadily growing demand for aluminium in all branches of industry.

MACHINERY AND EQUIPMENT

Opportunity for Exporters of Ore Dressing Plant

Particulars are available of the copper reduction plant which the Atlas Consolidated Mining and Development Corporation are proposing to establish at Toleda on the Island of Cebu, Philippines. The exact requirements cannot be given until the test work on the project has been completed.

It has been found that the concentrates are amenable to treatment by roasting in a furnace of the Dorrco Fluosolids type to a sulphate followed by acid leaching and electro-winning. Test work completed to date shows that by properly controlling the roasting a satisfactory sulphated product can be obtained. Leaching tests give recovery of 99 per cent of the copper in the calcine with a 2 per cent acid strength. Electrolytic precipitation is satisfactory with a power consumption of 1.1 kW. hour per pound of copper.

Based on the results to date, the following plant is reported to be under consideration:

Power will be generated by a steam turbine plant comprising two identical units each of 20,000 kW. rating, hydrogen cooled, 3,450 volts A.C., 3 phase 60 cycle, cooling being effected by condensers using water at 30 deg. C. There will be two boilers, each capable of generating steam for 20,000 kW. generators and designed to use bunker fuel with automatic control.

The roasting plant will comprise two Dorrco fluosolids roasters capable of handling 700 tons of 22 per cent copper concentrates daily.

The leaching vats are to be constructed locally, but handling equipment, circulating pumps, etc., will be purchased.

The electrolytic unit will consist of a tank house for production cathodes and strip circuit to finish recovery of copper in solution. Solution handling equipment and electrical gear will be purchased.

The acid plant will produce 60 per cent Baume acid by the tower or Petersen process from gases carrying 5.3 per cent SO_2.

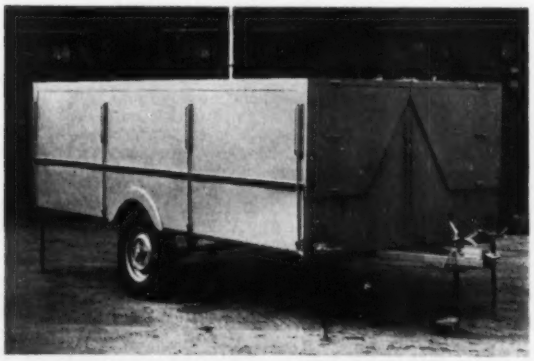
The managers of Atlas Consolidated are A. Soriano and Co., Soriano Building, Manila, who hold a controlling interest. Exporters interested should contact either of the Philippine companies.

We understand that the Export Services Branch of the Board of Trade hopes to obtain further details of the requirements as the test progress. (Ref.: ESB/11360/56.)

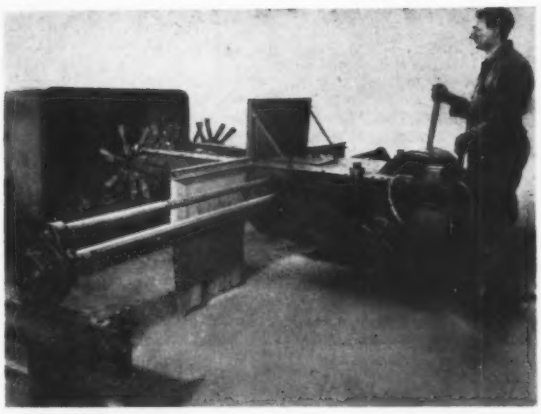
Folding Caravans With Prospecting Application

Four new-type 2-wheel folding camp trailers, first of their kind to be made in the U.K., were shipped recently to Turkey for use by geologists and geophysicists engaged on oil survey and exploration activities. Specially designed in conjunction with Shell engineers, these caravans were supplied by the United British Caravan Company, Ltd.

When closed for transit purposes, the trailers form box-like structures 15 ft. 6 in. long, 6 ft. 6 in. wide and 5 ft. 10¼ in. high which, weighing 17 cwt., are easily towed by Land Rovers.



A caravan closed for purposes of transit



The fully-powered horizontal cleaner

These units are of obvious interest to the mining engineer, with particular reference to prospecting activities in areas of difficult terrain ill provided with facilities of communication and transportation.

Mine Car Cleaning Plant

A British-built mine-car cleaning plant that has been developed from designs used extensively on the Continent for several years. The manufacturers are Humphreys and Glasgow, Ltd. The unit, which is illustrated above, was demonstrated to representatives of the technical press at the manufacturers' Billericay, Essex, depot on May 16, 1956.

The fully powered horizontal cleaner is recommended for use with mine-cars that have been used for carrying stone from stone-headings, particularly if the headings are very wet or if a great deal of water liable to cause concreting in the mine-car bottoms has been used for dust control. The cleaner installed for demonstration at Billericay was of this type. Driven by a 3-phase, 5 H.P., 550 volt totally enclosed electric motor with star-delta starting, this machine has four radial steel hawser brushes mounted on two forward protruding jibs. The brushes are set slightly off-radial on their revolving hubs so that they can plough into the dirt. Cut up pieces of waste wire haulage ropes are suitable as brush replacements but picks can be provided for especially obstinate dirt.

Two versions of the horizontal cleaner are obtainable. One is capable of cleaning two mine-cars coupled together in a tippler. The other is narrower, and will clean a single mine-car at a time.

The mine-cars are turned through 90 deg. to be cleaned and then turned through a further 90 deg. so that the loosened dirt can fall into a disposal bunker below the tippler.

Exterior of caravan, unfolded for occupancy

MINING MISCELLANY

The World Bank has announced a loan of $25,000,000 to Norway for hydro-electric power development. It will help to finance the Tokke power project, which will add 400,000 kW. of generating capacity to the electricity network which serves south-eastern Norway.

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It is reported from Bolivia that the Board of the Mining Corporation resigned in March but is carrying on until new appointments have been made. The corporation hopes to recruit a new general manager and his immediate staff abroad, and the Bolivian Embassies have been instructed to look for suitable candidates.

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Mining is gaining in importance in Haiti, states a report issued by the International Bank for Reconstruction and Development, which recently made a loan of $2,600,000 to help finance a three-year road improvement programme. The export of bauxite on a substantial scale is expected to start in 1957 and copper exploration has yielded promising results.

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The draft law for the establishment of Turkey's new Ministry of Industry, Mines and Power has been submitted to Parliament. Apart from organizing the development of the country's industrial and mineral resources, the Ministry will supervise the activities of various semi-state organizations such as the Sümerbank, the Etibank, the Karabük Steel Works and the Mining Research Institute.

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Yuba Consolidated Gold Fields, pioneer California placer gold dredging operator, has sold one of its laid-up gold dredges for use in Korea. The dredge will be re-erected after modification at Benicia. The United Nations Korean Reconstruction Agency has signed contracts aggregating $521,500 to cover the project, which is planned to work gold-bearing ground in Southern Korea estimated to contain approximately $3,500,000 of recoverable gold.

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Federal aid to gold mines under the Emergency Gold Mining Assistance Act is to be extended to the end of 1958 at existing rates, it has been officially announced by the Canadian Government. All except two of Canada's established gold mines receive the subsidy based on a formula intended to relate production costs to the fixed price of gold. The possibilities of developing a Canadian market for trading in gold bullion are to be thoroughly investigated by a committee of the Canadian Metal Mining Association. Mr. P. T. Birks, president of the Consolidated Howey and East Malarctic, has been appointed chairman of the committee, which also includes Messrs. P. R. Brown, J. R. Bradfield, J. B. Redpath and P. N. Tapley.

PERSONAL

"The Study of Technology as a Branch of Education" was the theme of the presidential address delivered by Professor C. W. Dannatt (Professor of Metallurgy, Royal School of Mines), at the annual general meeting of the Institution of Mining and Metallurgy on May 17. The Gold Medal of the Institution was awarded to Dr. Joseph Austen Bancroft, whose work has been linked with the Copperbelt since 1927. Honorary Membership of the Institution was conferred on Col. the Hon. Charles Arthur Banks, C.M.G., the Rt. Hon. Viscount Chandos, P.C., D.S.O., M.C., and Mr. George Francis Laycock, M.C., past-president of the Institute. The Consolidated Gold Fields of South Africa Ltd. Gold Medal for the Session 1954-55 was awarded to Mr. Jean Fernand Gaston Robert Heywood for his paper entitled, "Pressure manifestations at great mining depths on the Witwatersrand"; and the Consolidated Gold Fields of South Africa, Ltd. premium of forty guineas for 1954-55 to Dr. Johannes Jacobus Brummer for his paper entitled, "The geology of the Roan Antelope orebody". The William Frecheville Student's Prize for the Session 1954-55 was awarded to Mr. Frank Marcus Vokes and Mr. William Gordon Jeffery conjointly for their paper entitled, "The geology of New Consuls mine, Cornwall".

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Mr. M. A. Mawby and Mr. R. C. Atherton have been elected directors of the Consolidated Zinc Corporation Ltd.

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Mr. R. Pitman Hooper and Mr. M. A. Mawby have been elected directors of New Broken Hill Consolidated Ltd.

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At a meeting of the American Tin Trade Association the following officers were appointed: President, Mr. E. R. Dondorf, of the National Lead Co.; vice-president, Mr. Meyer Abrams, of the American Metal Co., Ltd.; treasurer, Mr. H. V. Boyce, of African Metals Corporation.

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Mr. W. E. A. Robinson has been appointed alternate director to Sir Eric Young on the board of the South West Africa Company Ltd.

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Following the retirement of Sir Ronald Matthews from the chairmanship of the Brush Group Ltd., Mr. Geoffrey Eley has been appointed chairman of the Board of Directors. Mr. Miles Beevor has been appointed deputy chairman and joint managing director and Mr. Ian T. Morrow joint managing director.

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Mr. L. R. Hedgcock, formerly manager of the London and and Midland Region, has been made Divisional Manager (Regions) of Tecalemit Ltd. Mr. G. W. Ely, formerly London and Midland Regional Supervisor, has been appointed assistant to Mr. Hedgcock. Mr. D. A. Monaghan, formerly manager of the Scottish and Northern Ireland Region fills the position vacated by Mr. Ely. Mr. J. J. Bell becomes manager of the Scottish and Northern Ireland region.

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Mr. C. T. Sweet has been appointed managing director of Knapp and Bates Ltd. in succession to the late Mr. E. A. Knapp.

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Liquid metals were the subject of one of four symposia held at a meeting of the American Institute of Chemical Engineers in New Orleans on May 6 - 9. The availability of the alkali metals was discussed by Marshal Sittig, of the Ethyl Corporation, in the light of raw materials supply, present manufacturing facilities for the various metals in different countries, and possible future expansion of production in the light of forecast demands.

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The Summer Meeting of the Institution of Mining Engineers will be held in Freemasons' Hall, 96 George Street, Edinburgh, on June 20, 21 and 22, 1956.

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A ground breaking ceremony took place on May 17 on an undeveloped part of International Harvester's 62½ acre factory site at Doncaster. This was to mark the beginning of work on a vast new service parts warehouse.

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Following many reports from industry, a panel of industrialists and experts on automation will preside over a special six session evening conference on automation, sponsored by the College of Production Technology, Charing, Ashford, Kent. The course will start on June 4 and end on July 9, each session being from 6.30 p.m.—8.30 p.m.

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The Fifth World Power Conference will open in Vienna on June 17, 1956.

CONTRACTS AND TENDERS

The British Iron and Steel Corporation (Ore) has entered into a contract with Canadian Javelin for the supply of 1,000,000 tons of iron ore annually with an option on an additional 1,000,000 tons. The deposits are situated about midway between Knob Lake and Seven Islands, some 40 miles west of the railway. It is reported that the contract contains a clause to the effect that Canadian Javelin must satisfy B.I.S.C. (Ore) by the end of 1956 that it has been able to raise enough capital to meet the substantial expenditure involved in the construction of an ore concentration plant and of additional loading facilities.

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Applications have been received by the International Co-operation Administration (I.C.A.) for the commercial procurement of various commodities, plant and equipment for Turkey. The commodities listed include pig tin (ingot), amount $400,000; Straits refined tin ingots, $400,000; sulphuric acid, $200,000; phosphate rock, $300,000. Interested suppliers should communicate immediately with the buyers. Further information is obtainable from the Board of Trade, Export Services Branch, Lacon House, Theobalds Road, London, W.1. Telephone: Chancery 4411, Extension 360. B.O.T. Ref.: ESB/12362/56/I.C.A.

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I.C.A. has recently announced the following authorization: *Taiwan (Formosa)*. Construction, mining and conveying equipment. (PIO/C No. 84-23-050-9-60239). Contract period, 12/4/56-31/7/56. Terminal delivery date, 31/12/56. Amount, $55,000. B.O.T. Ref.: ESB/12423/56/I.C.A.). Telephone enquiries to Chancery 4411, Extension 360.

METALS, MINERALS AND ALLOYS

COPPER.—The first sign of a break in the American copper price level came this week when American Smelting and Refining lowered its quotation by 2 cents to 43 cents per lb. There is no indication as yet whether the other custom smelters will be forced to follow suit or whether the big producers will now be able to hold their price at 46 cents. Before the reduction demand had been slight and there was a report of a dealer being unable to find a buyer for June copper at 44½ cents. Even after it was made there was no rush to buy and fabricators are taking it as a sign of the price cracking and not as a bargain buy. The fall coincided with the release of figures which showed a drop of 35 per cent in fabricator sales in April (the size of this fall must have come as a nasty shock) and an increase of fabricator copper stocks of 21,000 tons to 413,979 tons.

The American price structure is now puzzling. On the one hand the big producers are probably making a mistake in hanging on to the 46 cent level till after the wage negotiations are completed (that seems the only explanation of their complete disregard for the London trend). At one time this policy seemed sensible enough but circumstances have overtaken it. The producers are back at their old game of creating big price swings in their efforts to avoid little ones. On the other hand the fabricators are taking a big gamble in bearing copper so vigorously before the outcome of the wage talks is known.

Meanwhile the London spot price fell to £323 10s., the lowest of the year so far.

In a speech this week Mr. Prain described the recession in copper prices as " healthy and in the interests of the copper industry as a whole." He added " The danger of a serious slump in the copper industry is far less with a reasonable copper price than it would be on a rising market," repeating his view that the Copperbelt could see copper down to £240 and still make a before-taxes profit of £40m. - £50m., but a price of £280 would give a fair price and discourage substitution.

Mr. Prain also announced the decision to open Chambishi, subject to certain conditions, and to raise the output from Mufulira by up to 50 per cent of present production. Chambishi could produce at least around 16,000 tons a year ; with Mufulira producing at rather under 100,000 tons that figure could presumably be raised to 150,000 tons or thereabouts. But the expansions are dependent on the completion of Kariba and the availability of adequate railway capacity. This must put the expansion back for some years and as Mr. Prain twice pointed out that he could not be pressed into giving any more detail, the question arises why he made the announcement when he did. The answer must be — if the preamble on copper pricing is taken into account — that Mr. Prain judged it opportune to emphasize that Rhodesian copper producers would not be seduced into abandoning their expansionist policy by a temporary faltering in the demand for the metal.

Agusan Consolidated Mining Company announces that it has discovered a rich copper ore in it's gold and silver mine at Cabawan, Rosario, in the Philippines. The average copper content is put at 10 per cent.

LEAD.—Lead has been steady but inactive on the basis of 16 cents per lb. New York. The disappointing news from the automobile industry has dimmed hopes of an early revival of buying for large scale battery output. Nevertheless the dearth of car buying now should make a revival in the autumn more of a certainty. The wildcat strike at Bunker Hill which lasted a week and involved 900 men is now over. The union has denied responsibility for it.

First shipments of lead ore from Mestersvig, Greenland are to start in about three months time. Because of the arctic conditions shipments have to be made between August and mid- September. By August about 7,000 tons will be available for shipment. Next year shipments will rise to 18,000 tons.

TIN.—Tin has been quiet in New York and prices have fallen fractionally to 97 cents for spot Straits metal. ; Holiday influences appear to have been enough to outweigh the fluctuating news from Penang, where talks on the dockworkers' wage claim and other demands have threatened a strike for some weeks past. The latest news is that the strike has broken out but negotiations are to be resumed. Certainly the market seems to be more concerned with the weak spots in the American economy than with the consequences of the failure of the talks on the constitutional future of Singapore.

On this latter point an impression of calm has arisen owing to absence of violent reaction in Singapore. But the immediate situation will not be clarified till Mr. Marshall has announced his intentions. If he resigns, the Labour Front will only be able to keep power with the help of right wing supporters ; ultimately this may discredit the Labour Front with the Left and turn its supporters toward the People's Action Party. Alternatively P.A.P. may be able to force elections. In either event, Singapore's Government seems likely to move leftward in the not distant future.

Sir Ewen Fergusson, chairman, Straits Trading Company, has spoken of the difficulty of making long-term decisions in the present unsettled circumstances and of disruptive elements in both Singapore and Malaya. He said that world demand for tin had not been satisfied and that the new continuous strip mills now being built should be beneficial to mining. He thought that current prices were adequate to maintain output but a fall of 10 per cent would cause marginal mines to curtail output.

Mr. A. F. Taylor, chairman, Guthrie and Company, has repeated the warning of the danger of depletion of Malaya's mining reserves ; he said it was the main difficulty facing the industry in Malaya.

Mr. D. T. Waring has said that the I.T.A. could not start functioning till the end of 1956 because it would take that time to get the buffer stock in operation.

World mine output of tin-in-concentrate was 14,300 in March against 12,400 in February. In April Indonesia produced 2,026 tons and the Belgian Congo 1,169 tons.

The House of Representatives has passed the bill ordering the sale of the Texas smelter and it now goes to the Senate.

ZINC.—Zinc has been moderately active on the basis of 13.50 cents per lb. for prime western grade with most of the demand for that type of metal. Die casters are again notable for their absence from the market and a recent figure shows that in February zinc consumption by die casters was 19 per cent down since November 1955. Apart from the fall in demand for special high grade for automobile production the zinc producers are faced with a falling demand from the brass mills which are also feeling the effects of recession in Detroit.

The new " Zorka " zinc smelter has begun trial operations at Sabac in Serbia.

ALUMINIUM.—Now that full production is being resumed at Alcan's smelters in the province of Quebec, a reversal of the downward trend in shipments to the U.K. and elsewhere may be expected. In the U.S. industrial users will benefit from the attainment of the minimum stockpile goal for aluminium. Mr. Arthur Flemming, director of ODM, has announced that, in view of the current high demand by consumers, purchases towards the long-term stockpile objective will not be made at this time. This will release an additional 200,000 tons for industrial use, bringing to 400,000 tons the amount of aluminium thus made available to industry in 1956. Despite these favourable developments, and notwithstanding the recession in the motor car industry, there is no indication that aluminium will become plentiful in the immediate future.

With the coming of spring, site work has begun on the projected primary aluminium reduction work of the Canadian British Aluminium Company at Baie Comeau. As previously reported in *The Mining Journal* (23/3/56, p. 368) large orders for plant and machinery have already been placed in the U.K. It is hoped to pour the first ingot before the end of 1957 and that capacity will reach 80,000 tons—half the projected total—by early 1959. All production from the first unit is intended for the parent company, British Aluminium Ltd., which to-day has only sufficient primary smelting facilities to provide about half the requirements for its fabricating facilities, these having been very greatly expanded during and since the war. Adding to the problems of British Aluminium last year was the shortage of rainfall in Scotland, which forced severe curtailment of reduction operations at two plants and complete shutdown for a period at a third, due to inadequate supplies of hydro-electric power.

It has been reported that Alcan intends to spend $250,000,000 on the construction of a new hydro-electric project in Northern Quebec. The programme is designed to support 150,000 tons of new aluminium smelting capacity. The Quebec expansion, along with construction in progress at Kitimat, British Columbia, will increase the company's aluminium capacity to over 1,000,000 tons by the end of 1959, compared with 650,000 tons at the end of 1955. Alcan has placed a contract for the construction of two additional potlines at the company's Kitimat smelter. This project will be started immediately and is scheduled for completion in 1957. It will provide 66,000 tons of primary aluminium capacity additional to that already scheduled and lines currently in operation. Alcan now has three lines in production at Kitimat, one of which was recently put in operation with a combined capacity of 120,000 tons a year. Two additional smelter lines at present under construction have a scheduled capacity of 30,000 tons each. When

all six lines are in operation substantial progress will have been made towards the announced target for British Columbia capacity of 330,000 tons by 1959, a total of 246,000 tons becoming available by the end of 1957. Construction work is also to be started immediately on an expansion programme, costing $1,750,000, which will substantially increase the production of plain aluminium foil at the Kingston, Ontario, plant of the Aluminium Company of Canada.

BISMUTH.—Further light on bismuth's potentialities as a nuclear metal to which we referred last week (*The Mining Journal*, 18/5/56, p. 615), is thrown by a recent announcement that the U.S. Atomic Energy Commission has signed a contract for the design and production of an experimental power reactor using liquid bismuth as the fuel element. It is believed that by enabling the reactor to operate at high temperatures and low pressures, this fuel will allow steam to be produced under conditions comparable to those in conventional coal or oil-fired boilers. This application, if it proved technically and economically successful, might well have a significant impact on the future demand for bismuth metal.

NICKEL.—Further information is now available regarding the plans of the U.S. Government to stimulate the production of nickel. ODM has raised the expansion goal to 220,000 s.tons of nickel annually with 1961 as the target date. This compares with the present goal of 190,000 tons, which has never been reached. Annual supply now runs at about 150,000 tons a year. Under the new purchase programme the agency will offer contracts to buy the metal at prevailing prices to companies expanding nickel production. These purchase contracts will include a minimum price provision. The purchases will be financed by Defence Production Act funds. The programme takes in both domestic and imported nickel. Companies which expand their production facilities are entitled to apply for rapid amortization for tax purposes until the goal is reached. This will enable them to write off a percentage of new or expanded facilities in five years rather than at the normal rate. In effect the company will be allowed to pay less taxes during the first years of operation, but increased taxes during the later years. Having regard to the very rapid rate at which production is currently being expanded from established sources of supply, it may be assumed that one of the main objectives of the new purchase programme is to encourage the exploitation of the vast tonnages of low-grade ore in Cuba and elsewhere

TITANIUM.—Titanium Metals Corporation of America, owned jointly by Allegheny Ludlum Steel Corporation and National Lead Co., has reduced the price of titanium sponge metal by 20 c. a pound to $3.25. This is the fourth cut made by the company in 14 months, but at 21s. (less than $3) per lb., I.C.I.'s titanium still remains the cheapest in the world. Titanium metals are also reducing by about 6 per cent their prices for all mill products:—sheet, strip, billet, bars, extrusions and wire. These reductions will apply to a record backlog of orders and will represent savings to customers totalling more than $2,000,000. They have been made possible by cost improvements achieved as a result of volume production. In announcing the price reductions, the company pointed out that each one had generated an increasing volume of non-military applications. It is predicted that within several years defence orders will be supplemented by sizeable and diverse applications throughout the chemical processing, civilian aircraft, marine, pulp and papermaking, atomic power and pharmaceutical industries.

PLATINUM.—Demand on the U.S. platinum market has shown no signs of easing, while there has been no improvement in supplies on offer. Baker and Company of America, one of the two leading refiners, has increased its price by $6 to $103 for wholesale quantities and $105 for retail lots, this being the first change since the end of October. The other major seller, Johnson, Matthey and Co., is maintaining its rates unchanged and is reported to be doing some business with contract customers in the petroleum industry at prices as low as $95. Outside dealers continue to offer metal at prices ranging up to $110, depending on quantity and individual situations. Trade sources understand that Baker Platinum Limited, of London, is not raising the price of platinum from the rate of £34 per troy oz. at present being quoted by both the leading refiners.

The London Metal Market

(From Our Metal Exchange Correspondent)

The week has seen a further fall in the value of copper, and it now appears as if the market may have to go to lower levels before stability is reached. It is believed that a number of " bear " accounts have now been covered, and with the continued absence of orders from consumers this means less support during a fall than has been the case recently. In America the situation is still far from clear, but with demand at a very low ebb a further reduction in price below 43 c. per lb. is probable: sentiment there is also tending towards the belief that a new wage agreement in the copper industry will be negotiated without any strike.

The tin market has remained reasonably steady in the face of repeated rumours and counter-rumours about a strike in Penang, and now that this has become a reality prices may tend to firm up even against the general trend of those of other non-ferrous metals. On Thursday morning the Eastern price was equivalent to £768 per ton c.i.f. Europe.

Lead has remained a good market, owing rather to fewer offerings than to additional consumer enquiry, but as the period under review covers the Whitsun holiday this is hardly unexpected.

The zinc price has declined faster than that of lead, as demand from the motor industry for the highest grades is almost non-existent and apart from spasmodic inquiries the off-take of other grades has been disappointing.

Closing prices and turnovers for four days are given in the following table:—

	May 17		May 24	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£341	£341¼	£313	£314
Three months	£331	£331½	£309	£309½
Settlement	£341¼		£314	
Week's turnover	8,125 tons		6,475 tons	
Tin				
Cash	£753	£754	£752	£753
Three months	£753	£755	£752	£753
Settlement	£754		£753	
Week's turnover	685 tons		465 tons	
Lead				
Current half month	£111¼	£112¼	£110¼	£111
Three months	£110¼	£110½	£108¼	£109
Week's turnover	3,025 tons		2,350 tons	
Zinc				
Current half month	£94¼	£95½	£92¼	£93
Three months	£92¼	£93	£90¼	£91
Week's turnover	4,125 tons		5,350 tons	

OTHER LONDON PRICES — MAY 24

METALS

Aluminium, 99.5%, £189 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 12s. 0d. lb.
Chromium, 6s. 11d. lb.
Cobalt, 21s. lb.
Gold, 249s. 4d.
Iridium, £29/31 oz.
Manganese Metal (96%-98%) £269 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade) £519 per ton
Osmium, £24/27 oz. nom.
Osmiridium, nom.
Palladium, £8 0s./£8 10s. oz.
Platinum U.K. and Empire Refined £34/£35 oz. Imported £38 0s./£39 0s. oz.
Rhodium, £42.
Ruthenium, £15/£17 oz.
Quicksilver, £86 10s./£87 ex-warehouse
Selenium, 112s. nom. per lb.
Silver, 78⅞d. f.oz. spot and 78⅝ f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 60% 8s. 3d. c.i.f.
30% 5s. 0d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (semi-friable) 48% £15 15s. 0d. per ton c.i.f.
,, Refractory 45% .. £14 15s. 0d. per ton c.i.f.
,, Smalls 42% .. £12 15s. 0d. per ton c.i.f.
Magnesite, ground calcined .. £28 0s./£30 0s. d/d
Magnesite, Raw (ground) .. £21 0s./£22 0s. d/d
Molybdenite (85% basis) .. 8s. 2½d. nom. per lb. c.i.f.
Wolfram and Scheelite (65%) .. 264s.0d./269s. 0d. c.i.f.
Tungsten Metal Powder (98% Min. W.) .. 21s. 0d. nom. per lb. (home)
Ferro-tungsten (80%-85%) .. 18s. 0d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £39 3s. 9d. d/d per ton
Ferro-manganese, home .. £66 0d. per ton
Manganese Ore Indian Europe (46%-48%) basis 125s. freight .. .. 103d./105d. per unit c.i.f.
Manganese Ore(43%-45%) .. 97d./98d. per unit c.i.f.
Manganese Ore (38%/40%) .. 90d./92d. per unit
Brass Wire .. .. .. 3s. 2½d. per lb. basis
Brass Tubes, solid drawn .. 2s. 6½d. per lb. basis

COMPANY NEWS AND VIEWS

Wall Street Slide Upsets London S.E.

The behaviour of Wall Street during the past week has been anything but encouraging. Adverse effects of recent developments on the industrial scene, together with a good deal of doubt about the future course of business prosperity in the U.S., resulted in a slide in the *Dow Jones Industrial Index* to 480.16 by May 23 from 496.63 on May 17. *Rails* also suffered a drop during this period to 169.07 from 175.57. Whether or not these setbacks may be ascribed to the traditionally volatile nature of American stock markets remains, of course, to be seen. But some Wall Street observers feel confident that after the major decline which has taken place, some technical rally is due. Meanwhile, the minor support level of 483 has been broken and the next resistance point of 476 is being approached. The major support level of 465.72 established on February 15 is thus still a good way off.

Although London prices have not fully reflected this downward movement, markets have generally been dull. Reflecting this, the *Financial Times Industrial Ordinary Index* had receded by May 23 to 184.0 from 187.2 on May 17. Apart from considerations of waning U.S. optimism, London markets have had to cope with some depressing domestic news. Amongst this was an adverse movement in the terms of trade, and a fall in U.K. export prices during April. The lower level of motor production also constituted a bearish factor.

Under these conditions mining shares as a whole have attracted little favourable attention. Reports have reached this country, however, that a growing body of opinion in South Africa favours the present time as being auspicious for the purchase of gold shares. While such sentiments are by no means new, it would appear that present industrial uncertainties do indeed justify a closer look at these issues. Meanwhile Kaffir markets have been steady and the *Financial Times Gold Index* at 78.6 on May 23 compared with 79.4 on May 17.

Coppers and lead/zincs remained out of favour. This also applied to diamonds which in addition to fears regarding the U.S. outlook have suffered from recent reports regarding man-made stones.

S.A. Gold Statistics for 1956 March Quarter

Although the number of natives employed by South African gold mines improved to a monthly average of 327,000 during the first three months of 1956, compared with an average of only 322,000 during the corresponding period of 1955, tonnage milled by Transvaal companies showed no gain over the previous year's figures. In view of this, and recent wage awards granted to miners, working costs advanced by 1s. 7d.

TRANSVAAL AND O.F.S. GOLD AND URANIUM PRODUCERS
Comparison and analysis of salient results for the first three months of 1956 and 1955

	Heading	*Jan. to Mar.*	*Transvaal Cos.*	*O.F.S. Cos.*	*Total*
1	Tons milled : Millions	1956	14·3	2·1	16·4
		1955	14·3	1·6	15·9
2	Ounces produced : Millions	1956	3·1	0·7	3·8
		1955	3·0	0·5	3·5
3	Grade per ton : Dwt.	1956	4·1	6·5	4·4
		1955	4·0	5·8	4·2
4	Working profits (Gold): £m	1956	8·0	3·1	11·1
		1955	8·8	1·6	10·4
5	Working profits (Uranium): £m	1956	4·6	1·0	5·6
		1955	3·3	0·1	3·4
6	Total profits (4 + 5) : £m	1956	12·6	4·1	16·7
		1955	12·1	1·7	13·8
7	Working costs per ton : s.d.	1956	40/5	52/10	42/1
		1955	38/10	51/7	40/1

In the case of Orange Free State companies, however, the rapid output which is in progress resulted in a sharp rise in tonnage milled. Nevertheless—due perhaps to the large amount of excess development work which is being carried out—costs in this area also increased.

St. Helena : An Exceptionally Cheap O.F.S. Share

Although most gold issues have been out of favour with investors for many months past—growing production and profits achieved by mines in the new Orange Free State field having been ignored by a market far too preoccupied with industrial development to concern itself with gold purchases — the market pattern of St. Helena 10s. shares has presented an interesting study. Indeed, although the *Financial Times Gold Share Index* has recently broken through previous lows, the shares of this mine by not falling below 24s. appear to have established a new base resistance level. Indeed, the trend since last April when these shares rose to over 26s. could be described as stable, and the decline which has taken place has been due to neglect rather than liquidation. In fact, "Saints" have made a better showing than most. But this is not difficult to understand in view of the unusually good prospects for the mine.

The important thing to remember about "Saints"—as indeed all mines of the Union Corporation group—is that unlike other South African gold mining properties, a discount factor is applied to development results in order to conform with adjustments necessary in estimating ore reserves. This means that quarterly development values can—roughly speaking—be translated directly into potential reserves merely by dividing by the stoping width. As development values at "Saints" have been running at an average of around 400 inch dwt. for many months, it would appear that sufficient work has been carried out to enable the gold content of reserves, now totalling 3,000,000 tons at 6 dwt. per ton, soon to be upgraded to somewhere near 8 dwt. At present the mine's mill grade is no more than 6 dwt. per ton and there is, therefore, the possibility of a distinct improvement in the very near future.

Of course, this is only part of the story, for "Saints"—being bordered to the north by Western Holdings and to the east by President Brand—stands a good chance of finding rich payshoots from these two high-grade mines running through parts of its own property which are at present virtually unexplored. Yet, without attaching any significance to this hopeful factor, it would appear quite justifiable to base share valuations on an eventual 7 dwt. recovery basis.

In a few years' time when the property reaches its ultimate milling capacity of 1,800,000 tons per annum, it would thus be possible for yearly profits to be maintained at almost £2,000,000 after meeting all expenses and taxation. In making this calculation costs have been taken at 40s. per ton. But as they are at present already in this region, it would not be over-optimistic to anticipate a further reduction as output increases. Accordingly, even on a conservative estimate, some 3s. per share—or 30 per cent—could become available for distribution. If these dividends were to be capitalized on an 8 per cent yield basis, the company's 10s. shares could have a potential worth of 35s. to 40s.

Meanwhile, as a large capital expenditure programme is in progress at the mine—which will absorb £4,500,000 over the next five to six years—the immediate dividend outlook might appear somewhat uncertain. But on closer examination it becomes clear that, besides being able to meet these large commitments, the company should be in a position to distribute a further 1s. 6d. for 1956 (making 2s. in all) and maintain a level of 2s. 6d. thereafter until full capacity is reached and the 3s. rate becomes possible.

While earning their keep during the few years until expansion plans mature, "Saints'" 10s. shares should provide an exceptional opportunity for capital appreciation.

Virginia's Reduction Plant Should Soon be Completed

In his statement to shareholders of Virginia Orange Free State Gold Mining Company, Mr. S. G. Menell, the chairman, said that extensions to the company's reduction plant should be completed during the first half of 1956. In order that the milling rate might be increased rapidly to about 100,000 tons a month, mining was being carried out at a progressively increasing rate. Ore hoisted in excess of current mill requirements was being stockpiled and would be treated as plant capacity increased. Meeting Johannesburg, June 21.

Ofsits's Lower Investment Values

Although Sir Ernest Oppenheimer, chairman of the Orange Free State Investment Trust, in his statement to shareholders, did not deal extensively with the purely mining side of the O.F.S., he did say that basic underground problems of faulting and water had been largely overcome. Provided, therefore, that adequate supplies of European and native labour were available, the new gold field's progress to full production should now continue unhindered. From Ofsits's point of view this would mean a steadily rising dividend revenue which would, in turn, enable the company itself to make distributions.

No important changes were apparent from a study of the company's list of investments at December 31, 1955. A substantial fall in values, however, took place. Quoted holdings shown on the balance sheet at £16,936,583, as against £15,186,417 in respect of the preceding year, had a market value of only £33,046,273 compared with £46,203,978 at the end of 1955. The company's total assets at £18,854,566 contrasted with the previous figure of £17,239,508.

Western Holdings and Presidents Brand and Steyn were able to declare maiden dividends during Ofsits's past financial year, and a total of £304,366 had been received from this source. Unfortunately, however, total revenue at £404,254 showed only a small increase over the previous year's earnings of £327,043 due to a substantial drop in sharedealing profits to £54,880 from £227,254. Unappropriated profit carried forward rose to £188,021 from £87,315. Meeting Johannesburg June 8.

Extra Power for R.B.H.

It was probable that some time would elapse after the commissioning of the Kariba hydro-electric scheme before power from that source could be made available for the Rhodesian Broken Hill Development Company said Sir Ernest Oppenheimer in his statement to shareholders. The company's own power supply from the Mulungushi and Lunsemfwa hydro-electric stations was fully committed at the present scale of operations. Indeed, during the intervening period increases in the demand for power would inevitably arise due to mining at greater depths together with minor plant additions. Moreover, there were process improvements under consideration for which extra power might have to be secured.

The company's consulting engineers were, therefore, said Sir Ernest, investigating the capital cost of increasing generating capacity of Lunsemfwa by constructing a dam on this river and installing a third 6,000 Kw. generator. Should it be decided to proceed with this scheme, it was probable that an amount of about £1,200,000 would have to be found. Discussions with the Broken Hill Municipality had resulted in that body agreeing to provide some of the capital. In return the Municipality would draw power from the company in the event of the scheme being undertaken.

While the primary object of these expansions was to safeguard the position until further power became available, the proposed installation must not be considered as having an economic life which would end with the advent of production at Kariba. The cost of energy from the extended plants was estimated to be very low. In consequence the company would continue to utilize its own generating resources to the full, supplementing them later from other sources as required.

During the past financial year underground development together with diamond drilling at R.B.H. brought in a large block of new ore. At the end of the year ore reserves amounted to 1,723,000 tons proved and 1,304,000 tons indicated which represented an increase of 654,000 tons over those of the previous year. Meeting Northern Rhodesia June 13.

Mufulira and Chambishi Projects

Mufulira Copper Mines is to increase its output by about 50 per cent. The mine's present production is running at the rate of 100,000 tons of copper per year. In addition the Chambishi Mine — also owned as to 64 per cent by R.S.T. — is to be opened up on a scale initially equivalent at least to that of Chibuluma. At the latter mine production is scheduled for 16,000 tons of metal annually.

These announcements were made by Mr. R. L. Prain, president and chairman of the R.S.T. Group, at Bulawayo earlier in the week. Requesting that he should not be pressed for too much detail, Mr. Prain stated that much remained to be done in the way of planning and financing.

Higher R.S.T. Group Interim Dividends

Recent interim dividends from R.S.T. Group copper producing companies included a payment of 2s. per 5s. share from Rhodesian Selection Trust. This compared with 1s. 6d. in respect of the previous year. In the case of Mufulira the interim was 8s. per £1 share against only 6s. previously. Roan Antelope also increased its interim dividend to 1s. 9d. per 5s. unit from 1s. 3d. for the preceding year. Further details of regarding these distributions may be found in our dividend announcement table which appears elsewhere in this issue.

LONDON STOCK EXCHANGE PRICES — MAY 17 - MAY 23, 1956

Finance	Price May 23	+ or — on week
African & European	2⅛	..
Anglo American Corpn.	7/16	—¼
Anglo-French	19/3	..
Anglo Transvaal Consol.	1-1/16	—1/16
Central Mining (£1 shrs.)	35/9xd	—1/9
Consolidated Goldfields	52/6	—6d
Consol Mines Selection	1-1/16	..
East Rand Consols	2/1½	..
General Mining	3⅛	..
H.E. Prop.	7/6xd	—1½d
Johnnies	34/3	—6d
Rand Mines	3-7/32	—1/16
Rand Selection	1-15/32	..
Union Corporation	33/3	—9d
Vereeniging Estates	4¼	+1/16
Writs	31/3	—7½d
West Wits.	34/6	—3d
Rand Gold		
Blyvoor	23/-	+3d
Brakpan	5/9	—3d
Buffelsfontein	24/4½	—3d
City Deep	10/-	—3d
Consol. Main Reef	17/6	..
Crown	2	—1/16
Daggas	2-1/16	..
Dominion Reefs	17/3	+3d
Doornfontein	21/4½	—6d
Durban Deep	23/9	..
E. Champs	3/3	..
E. Daggas	8/6	..
E. Geduld (4s. units)	30/3	..
E. Rand Props.	49/7½	..
Geduld	4-1/16	+1/16
Govt. Areas	4/-	+1½d
Grootvlei	19/7½	+3d
Hartebeestfontein	36/4½	—7½d
Libanon	7/-	..
Luipaards Vlei	13/7½	—4½d
Marievale	19/4½	—3d
New Kleinfontein	3/10½	..
New Pioneer	13/1½	—3d
Randfontein	39/-	—9d
Robinson Deep	10/1½	—10½d
Rose Deep	10/6	..
Simmer & Jack	3/6	—3d
S.A. Lands	21/3	..
Springs	2/4½	—1½d
Stilfontein	23/6	—9d
Sub Nigel	30/7½	+1/10½
Vaal Reefs	27/9	—1/-
Van Dyk	2/3	..
Venterspost	11/6	—3d
Viakfontein	16/4½	+6d
Vogelstruisbult	17/3	..
West Driefontein	5½	—1/16
Rand Gold contd.		
W. Rand Consolidated	1-15/32	..
Western Reefs	28/1½	—7½d
O.F.S. Gold		
Freddies	6/9	—3d
Freddies Consolidated	4/-	..
F.S. Geduld	4½	—1/16
Geofflries	11/7½	—4½d
Harmony	23/7½	—9d
Loraine	5/3	—6d
Lydenburg Estates	15/-	..
Merriespruit	8/9	—3d
Middle Wits.	11/9	—6d
Ofsits	53/3	—1/3
President Brand	56/3	—9d
President Steyn	29/-	—1/-
St. Helena	24/10½	—4½d
Virginia Ord.	10/3	..
Welkom	19/9	—6d
Western Holdings	3-1/16	—1/16
West African Gold		
Amalgamated Banket	1/6	..
Ariston	4/7½	—1½d
Ashanti	16/9	—9d
Bibiani	2/1½	—1½d
Bremang	1/4½	—1½d
G.C. Main Reef	2/-	—1½d
Konongo	1/9	..
Marlu	2½d	..
Taquah	1/7½	..
Western Selection	8/4½	+1/1½
Australian Gold		
Gold Mines of Kalgoorlie	12/9	+3d
Great Boulder Prop.	11/3	..
Lake View & Star	15/7½	..
Mount Morgan	21/6	—6d
North Kalgurli	8/3	+6d
Sons of Gwalia	2/10½	..
Western Mining	9/7½	—1½d
Miscellaneous Gold		
Cam & Motor	8/7½	..
Champion Reef	6/4½	—1½d
Falcon Mines	7/6	..
Globe & Phoenix	26/-xd	—9d
Motapa	1/1½	..
Mysore	3/3	+1½d
Nundydroog	9/6	+3d
St. John d'el Rey	18/3	—3d
Zams	2½xd	—⅛
Diamonds and Platinum		
Anglo American Inv.	8-1/16	—1/16
Casts	23/4½xd	..
Cons. Diam. of S.W.A.	6½	—½
De Beers Defd. Bearer	4-1/32	..
De Beers Pfd. Bearer	14	—½
Pots Platinum	12/3	—1½d
Watervaal	19/6	—6d
Copper		
Bancroft	41/3	—1/3
Chartered	68/-	—9d
Esperanza	3/3	..
Messina	9-1/16	—1/16
Nchanga	13½	—½
Rhod-Anglo-American	5½	—1/16
Rhod. Katanga	26/3	—9d
Rhodesian Selection	48/6	—1½d
Rhokana	39½	+½
Rio Tinto	3xd	—⅛
Roan Antelope	28/3	+4½d
Selection Trust	4-1/16	..
Tanks	7½	—½
Tharsis Sulphur Br.	4½	—½
Tin (Eastern)		
Ayer Hitam	21/-	+3d
Gopeng	8/7½	+1½d
Hongkong	6/1½	—3d
Ipoh	24/-	..
Kamunting	8/6	..
Kepong Dredging	3/-	..
Kinta Tin Mines	14/3	+6d
Malayan Dredging	9/3	—1½d
Pahang	11/-	..
Pengkalen	12/3xd	—1/3
Petaling	8/-	..
Rambutan	25/-	..
Siamese Tin	10/4½	+6d
Southern Kinta	15/1½	—4½d
S. Malayan	7/3	+3d
S. Tronoh	6/-	..
Sungei Kinta	15/1½	..
Tekka Taiping	9/-	..
Tronoh	8/6	+3d
Tin (Nigerian and Miscellaneous)		
Amalgamated Tin	10/10½	—4½d
Beralt Tin	45/6	+9d
Bisichi	5/-	..
British Tin Inv.	21/9	+1/3
Ex-Lands Nigeria	2/6	..
Geevor Tin	14/3	—3d
Tin (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	1/7½	..
Jantar Nigeria	5/4½	—1½d
Jos Tin Area	12/3	..
Kaduna Prospectors	1/6	..
Kaduna Syndicate	2/3	—1½d
London Tin	9/6xd	6d
United Tin	1/1½	—1½d
Silver, Lead, Zinc		
Broken Hill South	57/6	..
Burma Corporation	6/-	—3d
Consol. Zinc	50/9xd	—2/6
Lake George	13/7½	+6d
Mount Isa	17/7½xd	—6d
New Broken Hill	41/6xd	—3/3
North Broken Hill	4-1/16	—1/16
Rhodesian Broken Hill	10/9	—1½d
San Francisco Mines	23/6	+3d
Uruwira	5/-	—6d
Miscellaneous		
Base Metals and Coal		
Amal. Collieries of S.A.	49/9	..
Associated Manganese	38/9	+6d
Cape Asbestos	9/4½xd	—6d
C.P. Manganese	28/9xd	—3/-
Consol. Murchison	2-1/16	—1/16
Natal Navigation	62/-	+9d
Turner & Newall	109/-	—2/-
Wankie	17/6	—3d
Witbank Colliery	4¼	..
Canadian Mines		
Dome	$25½	—1½
Hollinger	$48½	—1½
Hudson Bay Mining	$148	+7
International Nickel	$171½	+1½
Mining Corpn. of Canada	£9½	..
Noranda	$107½	—½
Quemont	£9½	—¼
Yukon	4/4½	..
Oil		
Apex	33/6	..
Attock	40/-	—3d
Br. Petroleum	143/6xd	+5/4½
Burmah	88/1½xd	..
Canadian Eagle	57/-xd	—1/3
Mexican Eagle	20/7½xd	—3d
Shell	8-1/16	—1/16
Trinidad Leasehold	39/6xd	+3d
T.P.D.	40/-	—2/-
Ultramar	41/4½	+1½d

Burmah Oil Company's Expansion

Total assets of The Burmah Oil Company at December 31' 1955, expanded to £82,542,035 from £56,493,616 in respect of the preceding year. The company's quoted investments entered at a balance sheet value of £32,088,862 showed a marked increase from the previous year's figure of only £10,714,505. Market value of these securities rose to £164,738,704 from the 1954 figure of £127,052,750. During the past year Burmah Oil's issued ordinary capital was increased by the issue of 20,604,770 shares. This had the effect of raising total issued capital — including cumulative preference stocks — to a total of £45,209,540 from £24,604,770. During the past financial year the company made net profits after taxation of £5,990,453 compared with only £3,728,869 previously. After dividends which absorbed £4,322,960 (£3,714,392) the balance carried forward was £640,486 against £610,888. Sir Kenneth B. Harper is chairman. Meeting Glasgow, June 14.

Amits's Increased Liquidity

Current assets of the Anglo American Investment Trust at December 31, 1955, amounted to £3,907,218 compared with £2,764,222 at the end of the previous year. And although current liabilities expanded to £1,955,482 from £1,254,315, the company's net liquid asset position improved considerably to £1,951,736 from £1,509,907. Quoted shareholdings shown on the balance sheet at £3,375,304 (£3,264,717) had a market value of £20,943,238 against £22,425,653 at the end of 1954. Total assets amounted to £12,830,236 against £11,663,120. During the past financial year the company's profits were £3,117,313 (£2,758,180). After providing £31,331 (£26,590) for taxation and placing £250,000 (£750,000) to general reserve, a total of £2,632,083 (£1,875,000) was paid out by way of dividends on ordinary and preference shares. Unappropriated profits carried forward rose to £843,454 from £639,555. At December 31 Amits's investments included 3,625,000 shares in the Diamond Corporation and 3,291,668 shares in De Beers Consolidated Mines. Sir Ernest Oppenheimer is chairman. Meeting Johannesburg, June 12.

Writs's New Investments

Proceeds from an increase in capital made by West Rand Investment Trust during the financial year ended December 31, 1955, were, said Sir Ernest Oppenheimer in his statement to shareholders, utilized in making substantial new investments. The company's holding in Buffelsfontein had accordingly been brought up to 2,200,000 shares from 825,714 previously while that in Vaal Reefs had been increased to 2,000,000 shares from 1,650,503 shares. In the case of Hartebeestfontein the participation had risen to 1,755,000 from 1,053,000 shares. On the other hand, the holding in Blyvoor had been reduced to 2,250,000 from 2,516,024 shares.

At the end of 1955, Writs's total investments were shown at £13,111,800. The value of these securities at December 31, taking Stock Exchange quotations where available and directors valuation (but not above cost) in other cases, was £22,083,484. Meeting Johannesburg June 8.

Exploratory Development at Vogels

The great success achieved on neighbouring mines in finding new payable ore by the advancement of stope faces into areas, where development had previously failed to demarcate ore reserves, was referred to by Mr. J. M. M. Ewing in his statement to shareholders of Vogelstruisbult Gold Mining Areas. Exploration of lower grade areas was accordingly being introduced in the north-western half of the company's property where there was now limited scope for discovery of new ore by ordinary development. Throughout the mine, said Mr. Ewing, the scope for development within known pay shoots was now limited, and development was assuming an increasingly exploratory nature. Results might, therefore, show considerable variation from quarter to quarter. At the same time, ore supplied to the mill from the various resources available might require to be reapportioned from time to time to correspond with variations in the disclosures of new ore made available by exploration. Nevertheless, milling results currently being obtained were expected to be maintained throughout the current financial year.

Vlakfontein's Capital Projects Near Completion

Should reasonable expectations be fulfilled, said Mr. Ewing, chairman of Vlakfontein Gold Mining Company, in his statement to shareholders, the company would complete at the end of the current year its long capital programme. This project, which included the sinking of No. 2 Shaft and an expansion of output from 38,500 tons to 50,000 tons per month, would have been completed and financed largely out of working revenue. During 1957, provided labour was adequate, the benefit to be derived from these projects should be realised in full. Mr. Ewing also referred to an approach made by the Town Councils of Brakpan and Springs Municipalities with a view to purchasing freehold areas totalling 550 morgen from the company. Although disposal of the land in question was not desired Vlakfontein wished to assist in the orderly planning of the neighbourhood. Accordingly, the land had been offered for sale at a price of £100 per acre provided certain conditions to protect mining requirements were complied with.

Reitfontein Reinvestigates Old Areas

With the virtual completion of the development programme in Reitfontein Consolidated's new lease area, work had been directed mainly towards a re-investigation of old areas and the opening up of intact ground in the excessively faulted south-west section of the mine. During 1955, mainly as a result of re-investigation and exploration, 83,408 tons—or approximately 26 per cent of the tonnage milled—had been drawn from stopes outside ore reserves. Yet, although substantial tonnages obtained during recent years from such sources had prolonged the life of the mine, the scattered nature of workings and increasing shortages of stope faces, were endangering present milling rates.

Stope Face Shortages at Simmer and Jack

During 1956 development at Simmer and Jack Mines has continued to be concentrated in the more promising zones of the mine, said Mr. W. M. Barclay, the chairman, in his statement to shareholders. In spite of this policy, however, the shortage of stope faces was becoming increasingly acute. A further reorganization of mining operations involving a reduction in the milling rate to about 100,000 tons a month had been instituted towards the end of 1955. The necessity for these measures became apparent as certain low grade areas ceased to be economic. Mining operations had been stopped in upper areas above 9 Level and operations curtailed in certain sections of the Howard Shaft area. Re-investigation of old sections continued to give satisfactory results. But with the exception of a limited area, now being developed to the east of the West Sub Vertical Shaft, results had generally been disappointing. As a result, the company's ore reserves could be expected to decrease during the next few years bringing a consquent decline in production.

Surprise Mining Pays 12½ Per Cent

With the recommendation of a dividend amounting to 12½ per cent in respect of the year ended December 31, 1955, on its issued ordinary capital of £51,919, the Surprise Mining and Finance Corporation has maintained the previous level of distribution. Subject to audit, results for 1955 showed a profit before taxation of £7,454 which, after income and profits taxes of £2,717, was reduced to £4,737.

An interim dividend of 25 per cent has also been declared in respect of the current year ending December 31, 1956. In the absence of any unforeseen circumstances, the company expects to pay a final of not less than 20 per cent gross.

Mr. R. B. Wickenden is chairman. Meeting, London, July 4.

RECENT INTERIM DIVIDEND ANNOUNCEMENTS

Company	*Year Ending*	*Dividend*	*Date payable*	*This Year to date*	*Total Last Year*
		%		%	%
Mufulira *a*	30. 6.56	40	July 4	40	100
Rho. Sel. Tst. *a* ..	30. 6.56	40	July 4	40	95
Surprise Mng. *e* ..	31.12.56	25	—	25	12½
Roan Antelope *c* ..	30. 6.56	35	July 7	35	80
Rawang Conc. ..	31. 3.56	15	June 13	15	27½
Cent. Norseman *b* ..	31. 3.57	30	June 29	30	60
New Jagersfont'n ..	31.12.56	2½	July 2	2½	5
Griqualand West *c* ..	31.12.56	2/11	July 2	2/11	5/10
Cons. Bultfont'n *d* ..	31.12.56	7½d	July 2	7½d	1/2½

a Divs less Rhodesian and Nyasaland income tax and territorial surcharge at 7s. 6d. in £.
b Divs in Australian currency.
c Divs paid on £10 shares.
d Divs paid on £1 shares.
e Co. anticipates that final dividend for 1956 should not be less than 20% gross.

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THE RHODESIA BROKEN HILL DEVELOPMENT COMPANY LTD.

(Incorporated in Northern Rhodesia)

HEAVY CAPITAL EXPENDITURE PROGRAMME

SUBSTANTIAL INCREASE IN ORE RESERVES

The forty-sixth annual general meeting of members of The Rhodesia Broken Hill Development Company Limited will be held at Nkana, Northern Rhodesia, on June 13. The following is the statement by the chairman, **Sir Ernest Oppenheimer,** which has been circulated to shareholders with the annual report and accounts :—

During the year, the market for zinc and lead was firm. Although the revenue from the sale of metals in 1955 at £4,028,000 was £487,100 higher than the previous year, production costs, realization charges, taxation and royalties were also higher and the net profit at £1,154,000 was only £129,000 larger than the previous year. The dividend of 1s. 3d. net declared for the year, which is the same as the previous year, absorbed £812,500.

Capital expenditure at the mine is likely to be heavy for some years and £350,000 was appropriated this year for this purpose. Of this amount, however, about £150,000 was spent during the year and only about £200,000 is available towards financing the future capital expenditure programme envisaged.

It is probable that some time will elapse after the commissioning of the Kariba hydro-electric scheme before power from this source can be made available at Broken Hill. Our own power supply from the Mulungushi and Lunsemfwa hydo-electric stations is fully committed at the present scale of operations, and during the intervening period there will be inevitable increases in the demand for power due to mining at greater depth and minor plant additions. Moreover, there are process improvements under consideration for which power may have to be secured.

The Consulting Engineers are therefore investigating the capital cost of increasing the generating capacity of the Lunsemfwa station by constructing a dam on this river and the installation of a third 6,000 kw. generator.

Should it be decided to proceed with this scheme it is probable that an amount of about £1,200,000 will have to be found and the Company has therefore had discussions with the Broken Hill Municipality which has agreed to provide some of the capital sums and to draw power from the Company in the event of this scheme being undertaken.

PRIMARY OBJECT OF EXPANSIONS

While the primary object of these expansions is to safeguard the position until Kariba power becomes available, the proposed installations must not be considered as having an economic life which would end with the advent of Kariba power. The cost of energy from the extended plants is estimated to be very low and consequently the Company would continue to utilize its own generating resources to the full, supplementing them later from other sources as required.

The Directors have under consideration the possibility of disposing of the Company's Iron Duke pyrites mine, which is situated in Southern Rhodesia some hundreds of miles from the Company's principal property. The production from the Iron Duke mine has hitherto been largely sold to the Northern Rhodesia copper mines, but recently this demand has fallen away and although other consumers of pyrites are expected to develop in the Federation your Directors are of the opinion that the capital tied up in this asset could be used to better advantage in helping to finance capital expenditure of direct benefit to the Broken Hill mine.

SALE OF BY-PRODUCTS

In addition it is anticipated that some profits will arise from the sale of by-products which have not previously featured in the Company's production programme. These comprise small quantities of cadmium and cement copper, it being profitable to treat the latter with copper at its present high price.

I must emphasize however, that it will be necessary for some years to continue to appropriate fairly substantial sums from profits.

The Consulting Engineers, however, are not yet in a position to place their recommendations before the Board of Directors, as further investigations must be carried out at Lunsemfwa and metallurgical tests finalized before this can be done.

During the year, underground development and diamond drilling has brought in a large block or ore which can now be included in the ore reserves. The ore reserves, at 1,723,000 tons proved and 1,304,000 tons indicated, are 654,000 tons greater than at the end of the previous year.

Further ore reserves will probably be added from what is known as the "X" orebody on the 950 foot level, but so far insufficient data is available to enable an assessment to be made of the tonnage or grade in this area. The ore reserves do not include the surface stockpiles of silicate and other ores which will be treated over a period.

Copies of the annual report and accounts may be obtained from the head office Kitwe, or from the transfer offices at 44 Main Street, Johannesburg, and 40 Holborn Viaduct, London, E.C.1.

Company Shorts

H.E. Prop. Expansion.—The consolidated balance sheet of H.E. Proprietary at December 31, 1955, revealed an expansion of total assets to £1,843,091 from £1,634,285. Current assets including quoted securities shown on the balance sheet at £964,067 (£666,093) had a market value of £1,376,349, and exceeded current liabilities by about £1,150,000. During the past financial year the company made net profits after taxation of £98,206 compared with £74,455 during the previous year. Dividends absorbed £51,750 (£51,000) and the balance carried forward rose to £61,654 from £49,545. Mr. R. Ellerton Binns is chairman and managing director. Meeting, London, June 14.

Water Sealed Off At Western Reefs.—With the sealing off of water entering underground workings in the Vaal Reef section of Western Reefs Exploration and Development Company, operations at the mine are returning to normal. A loss of tonnage has, however, been incurred and profits for May will inevitably be materially reduced.

Operations at Vaal Reefs Exploration and Mining Company have, it is stated, not been adversely affected.

Success of Union and Waterval Issues.—The recent offer of 300,000 5s. shares by Union Platinum Mining Company at 13s. per share was taken up to the extent of 99.09 per cent. In the case of Waterval (Rustenburg) Platinum Mining Company, the offer of 675,000 2s. 6d. shares at 13s. 6d. per share was subscribed as to 99.78 per cent.

97 Per Cent of Potgietersrust Offer Subscribed.—Of 1,177,500 9d. S.A. shares in Potgietersrust Platinums offered to members at a price of 8s. S.A. per share in the ratio of 1 for 10, a total of 96.9 per cent was subscribed.

INCO'S Record Earnings.—An interim report from the International Nickel Company of Canada shows net earnings for the three months ended March 31, 1956, of U.S. $26,614,000 after all charges, depreciation, depletion, taxes, etc. This was equivalent after preferred dividends to U.S. $1.79 per share on the common stock. During three months ended December 31, 1955, net earnings of U.S. $23,915,000 were equivalent to $1.61 a share.

The company has recommended a dividend of 65 c. per share, payable June 20.

Camp Bird May Offer 3 for 5 at Par.—Should an application by Camp Bird to make a rights issue be approved by the Capital Issue's Committee, the company will issue 1,304,331 shares at par in the proportion of three new shares for every five held. Mr. Dalgleish, the chairman, stated at the recent meeting that the company had been investigating further means of ensuring a liquid position and it was possible that certain share exchange transactions might be carried through in the near future. It would appear, he said, that in these ways the company could extend its capital without in any way depreciating the asset cover for new money raised.

London Tin Pay Two Per Cent More.— An interim dividend of 30 per cent has been declared by The London Tin Corporation on its £3,618,236 one class capital in respect of the year ended April 30, 1956. This compares with the previous year's corresponding interim of 28 per cent. No final will be recommended when the accounts are issued next September. Subject to audit net profits after taxation were about £883,000 against £687,833.

Mason and Barry Earns More and Pays More.—Profits in respect of the year ended December 31, 1955, made by Mason and Barry after all charges, including taxation and depreciation, rose sharply to £81,312 from £38,337 during the preceding year. A dividend of 15 per cent plus a cash bonus of 15 per cent on the issued ordinary capital of £185,172 in shares of £1 has accordingly been recommended. This represents an increase of 10 per cent over the previous year's distribution which consisted of a dividend amounting to 15 per cent plus a bonus of 5 per cent.

BISICHI TIN (NIGERIA)

The forty-fifth annual general meeting of Bisichi Tin Co. (Nigeria), Ltd., was held on May 17 in London. **Mr. W. J. C. Richards** (Chairman) presided.

The following is an extract from his Statement circulated with the Report and Accounts for the year ended December 31, 1955 :—

Production of the combined ores of Tin and Columbite from current mining at 938 long tons was 35 tons more than in the previous year but due to improved throughput in the dressing plant shipments were 231 tons greater. This largely accounts for the increase in revenue to £944,558 from £744,212. Our Tin output fetched an average price of £561 and Columbite £1,922 per ton against £536 and £2,113 per ton respectively in the previous year. Expenditure on the mines at £342,275 was higher by £143,606. Royalty and Income Tax paid in Nigeria represents 47% of the Nigerian expenditure.

We recommend the payment of a dividend of 40% which will leave the amount to be carried forward £121,467, which is greater than the amount brought in. The Directors have been led to this decision by the necessity for strengthening the Company's liquid resources. All the signatories having ratified the International Tin Agreement we anticipate having to provide cash to finance our share of the buffer pool.

During the period of a bonus price for Columbite there has been a tendency to mine the Company's richest deposits and this must now be changed or higher costs without compensatory higher metal values may make the poorer deposits uneconomic.

For shipment during the current year we have sold 265 short tons of Columbite at an average price of £1,716 per ton. We have noticed a more widespread consumption of Columbite at the lower prices which have prevailed since the U.S.A. stockpiling ceased and we have refrained from contracting to sell all our estimated production so that we can meet demand as it arises. We are selling at a satisfactory profit and I have no reason for changing my opinion that Columbite is becoming a long-term source of profit for this Company.

Since the end of the financial year we have agreed to purchase further properties in Nigeria. Their acquisition will augment the ore reserves and lengthen the life of the Company. The provision of finance for the development of these properties is being considered by the Board.

The report and accounts were adopted.

AMALGAMATED BANKET AREAS

The twentieth annual general meeting of Amalgamated Banket Areas, Ltd., was held on May 23 in London.

Mr. W. J. C. Richards (a Director) presided.

The following is an extract from the Statement of the Chairman, **Major-General W. W. Richards, C.B., C.B.E., M.C.,** circulated with the Report and Accounts for the year ended September 30, 1955 :

The profit of £119,405 was £78,954 higher than that of the previous year; and the balance to the credit of Profit and Loss Account before appropriations was increased to £248,079. Dividends aggregating 10%, less income tax, absorbed £162,275; leaving a balance of £85,683, which it is proposed to carry forward. It is satisfactory to note :—

(*a*) The record tonnage milled, at 961,662 tons, exceeded that of the previous year by 131,042 tons. The gold recovered, at 149,884 ounces, was up by 15,442 ounces.

(*b*)The overall cost per ton milled, at 30/2d. per ton, was 2/9d. per ton lower than for the previous year.

16,296 feet of development was accomplished; an increase of 7,179 feet over the previous year. 9,150 feet were sampled of which 4,005 feet (43.8%) proved payable, averaging 7.5 dwts. per ton over a width of 39.7 inches. In addition, 3,900 feet of Raising and Winzing was sampled, of which 2,750 feet (70.5%) was payable at 7.5 dwts. per ton over 38.8 inches.

Abbontiakoon. On the 20th Level "C" West Reef a continuous payable length of reef was exposed for 515 feet averaging 8.0 dwts. per ton over a width of 36 inches.

Mantraim. On the 12th Level East Drive South the continuous payable length of reef now exposed is 410 feet averaging 7.4 dwts. per ton over a width of 41.1 inches.

Effuenta. A total of 2,340 feet in drives and raises was sampled, of which 1,980 feet (84.6%) was payable, averaging 6.6 dwts. per ton over a width of 37.9 inches.

The total ore reserves as at September 30, 1955, were computed at 2,895,428 tons, as follows :

	Tons	Grade dwt.	Width ins.
Underground Ore	1,657,188	5.621	40.57
Surface Ore	1,238,240	1.801	121.1

The report and accounts were adopted.

MALAYA—Mining Engineers required for Group of Tin Mining companies. Only trained personnel considered. Commencing salary according to training and experience. Provident fund and non-contributory pension scheme. Three year contracts with six months' home leave on full pay. Write, giving full particulars of age, education, training and experience and marital status. Box 930, Walter Skinner, Ltd., 20 Copthall Avenue, London, E.C.2.

GOLD COAST. Vacancy for DRILLER, Department of Rural Water Development. Qualifications: Candidates must have had not less than five years' experience of water well drilling with percussion and rotary rigs, must be able to instal deep well pumping plant, and must be capable of carrying out field repairs to the drilling plant and of dressing their own tools. Preference will be given to candidates who have been apprenticed in mechanical engineering.

Terms of Service: The appointment will be on contract/gratuity terms for one tour of 18 months with a possible extension to two tours. Salary will be in the range of £1,250-£1,500 per annum (consolidated) according to age, qualifications and experience. A gratuity at the rate of £12 10s. for each completed month of satisfactory service will be payable on final termination of the contract.

Free passages on first appointment and on leave will be provided for the officer, wife and a maximum of three children under 13 years of age. The officer will normally be required to travel by sea.

Vacation leave with pay: seven days for each month of service. Furnished quarters available at low rental. Income tax at local rates, £60 kit allowance.

Candidates should apply to the Secretary for Recruitment, Gold Coast Office, 13 Belgrave Square, London, S.W.1, giving details of age, qualifications and experience and sending copies of recent testimonials if available.

MARCH TIN OUTPUT IN TONS OF TIN CONCENTRATES

Company	Mar.	Months since year end	Financial Year to Date This	Financial Year to Date Last	Company	Mar.	Months since year end	Financial Year to Date This	Financial Year to Date Last
EASTERN									
Ampat	125½	3	390½	331	Sungei Way*	*b*323	9	1060	1105
Anglo-Burma*	25	9	84	88	Taiping	60½	3	188½	169
Ayer Hitam*	182	9	524½	1187½	Tambah	15½	3	44½	42½
Berjuntai	40½	11	723½	654	Tanjong	125½	3	364½	258
Chenderiang*	56	12	220	201	Tekka*	34½	12	138½	149
Gopeng Consl*	195	6	398½	373½	Tekka Taiping*	23½	6	41½	126
Hongkong Tin*	94½	6	233½	142½	Tongkah H.	91½	9	563½	330½
Idris Hydraulic*	67½	3	67½	75½	Tronoh*	711½	3	711½	642
Ipoh Tin	51	12	286	556½					
Kamunting	182½	12	1845½	1034½	**NIGERIA**				
Kent (F.M.S.)*	71½	3	71½	71½	Amal. Tin	532	12	4435	4094
Kepong*	75½	9	237	194½	Amal. Tin†	69	12	573	615
Killinghall*	67½	6	155½	233	Bisichi	81	3	210	218
Kin a K.	24½	12	227½	200	Bisichi†	32½	3	90½	130
Kiata T.	31½	3	87½	87	Ex. Lands	64	3	171	177
Klang River	27	12	282	274½	Gold & Base	58	3	156	135
Kramat Tin	25½	12	364½	391½	Gold & Base†	16	3	41	44
Kuala Kampar	241½	12	1993½	2422½	Jantar	31	6	122	124
Kuchai	*a*162½	6	275½	268½	Jantar†	20	6	112	107
Larut Tin	98½	3	283½	286½	Jos Tin	11½	8	93½	96½
Lower Perak	199½	11	2263½	1841½	Kaduna P.	6½	3	12½	19
Malayan Tin*	803½	9	2102½	1167½	Kaduna S.	46	3	118	76
Malaysiam	11½	12	155½	130	Keffi†	40	12	465	433
Pahang Cons.	220	8	1645	1740	Naraguta Ex.	18½	3	56½	17½
Pengkalen*	121½	6	243	235½	Naraguta K.	13	3	38½	39½
Petaling*	332	6	711½	1073½	Naraguta T.	17	3	38½	44
Puket Tin*	164½	3	164½	188	Naraguta T.†	10½	3	19½	23
Rahman H.	33½	9	281½	318½	Ribon	22	12	212½	113½
Rambutan*	46½	9	169½	173½	Ribon†	2	12	28½	13½
Rantau	60	9	419½	555½	Tinfields of Nig.	3½	12	30½	28½
Rawang Tin	85½	12	1173½	868½	Tinfields of Nig.†	1½	12	13½	29½
Renong	54½	9	566½	899	U. Tin	6½	9	87½	115½
Selayang*	54	6	113	126½	U. Tin†	4½	9	55½	30½
S. Kinta	384½	12	2423½	4775	MISC.				
S. Malayan*	600	9	2054½	2175½	Beralt Tn	28	12	213	79
Siamese Tin	316	3	893½	565	Beralt Tin‡	191	12	1997	2065
S. Tronoh*	184½	3	184½	241½	Geevor Tin	61	12	655	634
Sungei Besi*	317½	12	1189½	1230½	S. Crofty Tin	59½	3	186½	161½
Sungei Kinta	30	3	97½	55½	S. Crofty Tin‡	3½	3	4½	nil

* Quarterly.
† Columbite.
‡ Wolfram.
a Dredge closed 8 days for overhaul.
b Two dredges working.

THE BURMAH OIL CO. LTD.

INCREASED GROUP PROFIT

CONTINUED EXPANSION IN WORLD TRADE IN PETROLEUM PRODUCTS

SIR KENNETH B. HARPER'S STATEMENT

The fifty-fourth Annual General Meeting of The Burmah Oil Company Limited will be held on Thursday, June 14, 1956, in the Merchants' Hall, 30 George Square, Glasgow.

The following statement by the Chairman, **Sir Kenneth B. Harper,** has been circulated with the Directors' report and accounts for the year ended December 31, 1955.

THE BOARD OF DIRECTORS

Mr. W. E. V. Abraham retired from the Board on November 30, 1955. His services will continue to be available to the Board in a consulting capacity.

Mr. R. P. Smith has been appointed Assistant Managing Director as from April 1, 1956.

ACCOUNTS

The year 1955 was one of continuing expansion in world trade in petroleum products. Trade in Burma, India and Pakistan reflected this world trend and our operations resulted in a Group profit of £6,018,174, being an increase of £886,963 over the corresponding profit for 1954. As is our usual custom the figure of profit has been struck after charging the cost of exploration programmes and in addition there has been charged this year losses resulting from the revaluation of the Pakistan rupee in July 1955.

£1,636,294 has been set aside for depreciation compared with £1,276,163 in 1954. The increased provision in 1955 is mainly in respect of the new seaboard installation which was completed recently in East Pakistan.

Dividends and interest received in 1955 amount to £9,250,909. The substantial increase of £5,022,904 over receipts in 1954 under this heading is due mainly to larger dividends received from The British Petroleum Company Limited and from our Trade Investments.

Full provision has been made for United Kingdom and Overseas taxation based on the profits for the year.

With the balance of £610,888 brought forward from 1954, the total amount available for distribution becomes £6,463,446. From this amount the Directors have allocated £1,500,000 to General Reserve and £2,961,936 for a final dividend of 12½ per cent. which they recommend should be paid on the Ordinary Stock. After making the foregoing appropriations to General Reserve and deducting the net dividends paid and payable on the Preference and Ordinary Stocks, the balance of unappropriated profit carried forward is £640,486.

In the Parent Company's Balance Sheet the increase in Advances to Subsidiary Companies reflects the expansion of the activities and financial requirements of those Companies.

Trade Investments also increased during 1955 as a result of our half share of the additional capital provided for Burmah-Shell Refineries Ltd.

The increases in Shares in Subsidiary Companies and in Quoted Investments are mainly the result of the revaluations in 1955 of our investments in Ordinary Shares of The B.O.C. British Petroleum Share Trust Ltd. and in Ordinary Stock of The British Petroleum Co. Ltd. The aggregate increment arising from these revaluations was transferred to Capital Reserve as is shown in Note No. 2 on the Accounts.

In accordance with the Resolution passed at an Extraordinary General Meeting held in July, 1955, the Company's Authorized Capital was increased from £25 million to £50 million and the Issued Ordinary Share Capital was at the same time increased by the issue of 20,604,770 Ordinary Shares to holders of Ordinary Stock.

PROSPECTING AND OILFIELD DEVELOPMENT OPERATIONS

Burma. The geophysical survey of the Irrawaddy Delta to which I referred last year has been started. The Government are providing protection against any insurgent activities in this area.

In Upper Burma it is proposed to drill a test well at Ondwe, an area thirty miles south of Yenangyaung, where a suitable structure is known to exist.

Both these operations will be undertaken by The Burma Oil Company (1954) Limited in which we hold a 55 per cent. interest.

During the year production at Chauk was increased to meet the needs of the refinery there and additional wells were completed in readiness to produce the supplies of crude oil which will be required for the new refinery at Syriam, near Rangoon, towards the end of this year.

India. Drilling results at Nahorkatiya have confirmed previous expectations that the structure is geologically complicated but I am pleased to say that on the whole they have been successful. Potential production in the area so far proved is judged to be sufficient to maintain a refinery throughput of one million tons a year for at least twenty years. Discussions are being held with the Government of India regarding the formation of a rupee company with Indian participation to take over and develop the oilfield at Nahorkatiya and certain other concessions in Assam. Additional refining capacity will be required. The location of this and the transportation of the crude oil are subjects which are also under discussion with the Government of India.

Pakistan. Pakistan Petroleum Limited, in which your company has a 70 per cent. interest, is continuing its vigorous exploration in both West and East Pakistan. The test well in the Uch area in West Pakistan to which I referred last year was completed without finding oil, but it has established a useful additional reserve of gas. The proved reserves of Sui and Uch together amount to the equivalent in calorific value of more than 120 million tons of fuel oil.

The laying of the Sui Gas Transmission Company's main line to Karachi was completed during the year and deliveries to consumers began in September, 1955. Consumption at the end of the year was at the level of 15 million cubic feet a day and this is expected to increase to 40 million cubic feet by the end of the current year

Meanwhile the Pakistan Government, through the medium of the Pakistan Industrial Development Corporation, have entrusted the Sui Gas Transmission Company with the construction of a further 16-inch pipeline from Sui northwards to Multan, a distance of approximately 200 miles. Preparations for this project are well under way. It is intended thereafter to extend the line to Lahore, a further 200 miles. We have no financial interest in the ownership of the line but we welcome this prospect of additional offtake of Pakistan Petroleum Limited's gas.

At the Annual General Meeting in June last I informed you that Pakistan Petroleum Limited's No. 1 test well at Sylhet had encountered gas at 7,800 feet and had been destroyed by fire. Preparations for drilling a second well are nearly completed and drilling is expected to start in a few weeks' time.

REFINERIES

I have already referred to the new refinery at Syriam, near Rangoon. Construction has been unfortunately retarded in consequence of the import licensing procedure introduced by the Burma Government to conserve foreign exchange. The refinery is expected to start up before the end of this year.

Digboi refinery has continued to operate satisfactorily but the limitations of rail transport for the products resulted in the refinery's output for the year being 16 per cent. below its full capacity.

The Burmah-Shell refinery near Bombay, in which we have a 50 per cent. financial interest and which has a capacity of 2 million tons per annum, came into full scale operation in the third quarter of the year. The refinery is now producing 45 per cent. of India's total requirements of petroleum and has been designed with a view to considerable expansion as and when required.

The recent Indian Budget imposes Excise Duties on diesel and furnace oils produced in the Bombay and Digboi refineries at the same rates as the respective existing Import Duties.

TRADING

Our trade in all areas through our Subsidiary Companies and through Burmah-Shell amounted to over 1¼ million tons of petroleum products; an increase of 12 per cent. over the previous year.

Of the total supplies to meet our trade, 28 per cent. came from our indigenous production, the balance being imported. (Here and elsewhere in this statement where I refer to "our" production or "our" trade I mean the operations of the Subsidiary Companies in which your Company holds over 50 per cent. of the equity, including the trade they do through Burmah-Shell.)

The ratio of indigenous to imported oil in the different areas varied, according to the location of the producing areas relative to the market, from 97 per cent. indigenous in Assam to 10 per cent. in the rest of India and nil in East Pakistan. The proportion should increase considerably in India when the

products from Nahorkatiya crude oil reach the market. In Burma the indigenous figure last year was 48 per cent. The immediate target of The Burma Oil Company (1954) Limited is to make Burma self-supporting once again in major petroleum products and it is with this objective that the refinery is being built at Syriam.

Security conditions in **Burma** continued to improve and our trade with it. Burma's internal troubles began in 1948 and it was not until 1953 that the demand for petroleum products again reached and passed the 1948 figure. 1954 was a better year than 1953 and 1955 better than 1954, the latter percentage increase being 12 per cent. We expect the current year to show continued expansion.

In **India** there was a general expansion in the demand for petroleum products in 1955. Kerosine still shows the highest sales gallonage though motor spirit and automotive diesel oil together are a close second. In the years 1952-54 our sales of motor spirit in India stood still, instead of advancing steadily as in most of the rest of the world, but in 1955 there was an improvement of 5 per cent. Automotive diesel oil sales also increased substantially.

While it is satisfactory that motor spirit sales have begun to advance again, heavy taxation both of the vehicle and its fuel and restrictions on the use of vehicles are having a restraining effect on the development of road transport. The President of the Indian Roads and Transport Development Association has recently pointed out that one effect has been that the annual increase in the number of motor vehicles in India dropped from 12½ per cent. in the period from 1936-51 to 3¼ per cent. in the period 1952-54. There was a slight improvement in 1955 which I hope will continue. It will certainly be needed if transport is to keep in step with India's second five-year plan.

While there was an overall increase in our trade in **Pakistan**, the offtake of individual products varied considerably. It was good in furnace oil, there was a reduction in motor spirit, an increase in automotive diesel oil and an increase in kerosine in West Pakistan offset by a reduction in East Pakistan. The decreases were a consequence of the difficulty of obtaining foreign exchange, affecting the operational side of our business in such ways as a shortage of tinplate. We cannot look for more than a modest expansion of trade in the current year unless the foreign exchange position improves and import licences for both products and tinplate are more readily granted.

PRIVATE ENTERPRISE IN INDIA

I referred last year to the difficulty we were experiencing in determining the precise place that is to be left for private enterprise in India's "socialist pattern of society," and in particular what room there will be for foreign capital and *expertise* in the Petroleum Industry.

A few days ago the Indian Prime Minister made a statement on his Government's revised Industrial Policy. The place for private enterprise in future will be "as an agency for planned national development in the context of the country's expanding economy." "Mineral Oils" are included in the category of industries of which all "new units" "will be set up only by the State," "save where their establishment in the private sector has already been approved."

At first sight, so far as "Mineral Oils" are concerned, this statement of revised policy does not differ appreciably from the policy announced in 1948. Both draw a distinction between "new units" and "existing undertakings" and we are at present engaged in conversations to clarify the future scope for our operations in India.

In the meantime Stockholders may have read in the press that on the advice of a team of Russian experts, after a three-months' general mineral survey of India, the Government have decided to enter the field of oil exploration with a programme to spend about £20 million over the next few years.

TANKERS

The fleet continued to give excellent service and was fortunately again free from accident. The year was noteworthy for the resumption of shipments by us from Abadan where the first of our vessels called in February, and the commencement in the same month of Indian coastal shipments from the Burmah-Shell refinery at Bombay. We have since been loading regularly at both ports and, by reason of their size and draft, our white oil vessels continue to prove particularly suitable for the Indian coastal trade.

With increasingly quick turn-round at loading and discharging points time ashore has been correspondingly restricted. Our Mail Advice Service, whereby next of kin are kept advised of the movement of our ships, is proving its value in enabling officers to obtain letters from home more quickly and is greatly appreciated by all concerned.

The Government of India have announced that it is their policy gradually to reserve the coastal tanker trade for the Indian Flag and that their immediate target is three ships. They have made a beginning recently by assisting an Indian Company to acquire one of them.

LABOUR

I am glad to report that the year brought no major strikes or interruptions in the field of labour although both Burma and India continued to experience prolonged litigation in the Industrial Courts. I am afraid that the too-frequent use of these Courts is for the time being an obstacle in the way of serious negotiation between employer and employee, thus hindering the growth of responsible trades unionism. It must be recognized, however, that the system of reference to adjudication can, and does, prevent strikes because in India, Pakistan and Burma a strike is illegal as soon as a dispute has been referred to official conciliation or adjudication.

STAFF

We are fortunate in the Management and Staffs we have, both at home and overseas, to conduct our business and deal with the new problems which are constantly arising and it is very pleasing to be able to record once again the Board's appreciation of their services.

VIRGINIA ORANGE FREE STATE GOLD MINING CO.

(Inc. in the Union of S. Africa)

BENEFITS FROM INCREASED MILLING RATE

The seventh ordinary general meeting of Virginia Orange Free State Gold Mining Company, Limited, will be held on June 21 in the Board Room, Anglovaal House, 71 Fox Street, Johannesburg.

The following is an extract from the statement by the Chairman, **Mr. S. G. Menell**, which has been circulated with the report and accounts for the year ended December 31, 1955 :—

Satisfactory progress has been made with increasing the milling rate at the mine, from a monthly average of 48,333 tons milled with a recovery grade of 4.065 dwt per ton during the first quarter of the year under review to a monthly average of 73,667 tons milled with a recovery grade of 4.309 dwt per ton during the quarter ended December 31, 1955. The corresponding profits from gold production, including sundry revenue, were £37,090 for the March quarter and £60,645 for the December quarter, the total for the year being £221,465. The production of sulphuric acid started in January, 1955, and the plant has operated satisfactorily throughout the year. A portion of the acid produced is used by the mine's uranium plant and the remainder is sold through the Chamber of Mines Acid Distribution Committee to certain of the other uranium producing mines. The working profit from acid production for the year amounted to £223,554. The production of uranium started in September, 1955; the working profit for the four months September to December amounted to £199,544 (subject to adjustment). The total profit from all operations for the year thus amounted to £644,563 from which must be deducted Debenture, Loan Stock and other interest of £252,825 and repayment instalments of loans obtained for acid production amounting to £152,191.

INCREASED ORE RESERVE

The effect of the policy of maintaining a rate of development in excess of current requirements is reflected in an increase in the Ore Reserve of 317,000 tons, to 1,067,000 tons as at December 31, 1955. It is proposed to continue with this policy until an Ore Reserve commensurate with the mine's eventual requirements is established.

During the quarter ended March 31, 1956, 231,000 tons were milled at a recovery grade of 4.371 dwt per ton, resulting in a working profit, including sundry revenue, of £65,190. In addition, the estimated profit from uranium and acid production was £307,464.

PROGRESSIVELY INCREASING RATE

Work is proceeding on the extensions to the reduction plant and it is anticipated that this programme will be completed during the first half of 1956. In order that the milling rate may be increased rapidly from the present figure to approximately 100,000 tons per month, mining is at present being carried out at a progressively increasing rate. Ore hoisted in excess of the current requirements of the mill is being stockpiled and will be treated as the capacity of the plant increases.

Since the close of the year, work has started on the deepening of No. 1 Shaft to serve the 31st level in order to facilitate the exploitation of the Basal Reef horizon down to the Harmony boundary.

MERRIESPRUIT (ORANGE FREE STATE) GOLD MINING CO. LTD.

(Inc. in the Union of S. Africa)

COMMENCEMENT OF GOLD PRODUCTION

The seventh ordinary general meeting of Merriespruit (Orange Free Sate) Gold Mining Company Limited will be held on June 21 in Johannesburg.

The following is an extract from the statement by the Chairman, **Mr. S. G. Menell**, which was circulated with the report and accounts for the year ended December 31, 1955 :—

As members are aware, milling for the production of gold commenced during March 1956 when 75,000 tons were milled at a recovery grade of 4.519 dwt per ton, resulting in a working profit, including sundry revenue, of £45,433. The flotation plant for the production of uranium-and pyrite-bearing concentrates was also brought into operation during March and treatment of the concentrates at the Virginia mine resulted in an estimated profit of £4,615.

Stope preparation was commenced during July 1955, and the ore broken was stockpiled on surface for use during the trial milling period and during the first few months of production. This has assisted in reducing the proportion of low grade development rock which would otherwise have been sent to the mill in the early stages of production and the mine has been able to commence production with a grade of ore higher than could otherwise have been expected.

SHAFT SINKING AND EQUIPPING

The shaft sinking necessary for the present requirements of the Mine was completed during the year and a connection between No. 1 and No. 2 Shafts was made on the 35th level during October 1955, thereby removing the single-entry restrictions imposed by the Mining Regulations. No. 1 Shaft is fully equipped and most of the permanent hoisting arrangements are now in service. No. 2 Shaft will not be equipped at the present time but will be used as an upcast ventilation shaft.

During June 1955, No. 2 Shaft intersected the Basal Reef horizon in an area where the reef had been subjected to erosion subsequent to its deposition and negligible values were obtained on sampling of the contact between the normal hanging-wall and footwall strata. The value obtained in the conglomerate at the base of the Elsburg Series, of 6.80 dwt over a channel width of 24.1 inches, equivalent to 164 inch-dwt, warrants further investigation of this reef at some later date.

DEVELOPMENT ON BASAL REEF

Development on Basal Reef is proceeding on the 30th, 31st, 33rd and 35th levels and a limited amount of work has been done on the Leader Reef between the 31st and 33rd levels in the vicinity of No. 1 Shaft. Up to the end of March 1956, the total footage advanced amounted to 60,353 feet. Of 25,630 feet sampled on Basal Reef 16,130 feet, equal to 62.9 per cent, were payable having an average value of 12.06 dwt over a channel width of 31.6 inches, equivalent to 381 inch-dwt. In addition, 1,425 feet were sampled on Leader Reef, of which 885 feet, equal to 62.1 per cent, were payable having an average value of 4.47 dwt over a channel width of 60.9 inches, equivalent to 272 inch-dwt. In addition to this development, the Leader Reef is being prospected by diamond drilling from the Basal Reef horizon.

Development operations have been retarded by the intersection in pilot holes of water-bearing fissures which it has been necessary to seal off by cementation.

MINING ENGINEER for prospecting required by alluvial mining company in British West Africa. Applicants must be qualified and have had bush experience. Basic salary £960 p.a.; overseas allowance £360 p.a.; marriage allowance £180 p.a. Free passages provided. Leave at 12 weeks for each twelve months' service granted annually. Married accommodation not available. Send details of age, education, qualifications and experience to C.9 Mine Employment Department, Selection Trust Building, Mason's Avenue, London, E.C.2.

Indian Chessman, part of the set once owned by Clive of India and now in the Museum of Indian Art.

Chequerboard of the East

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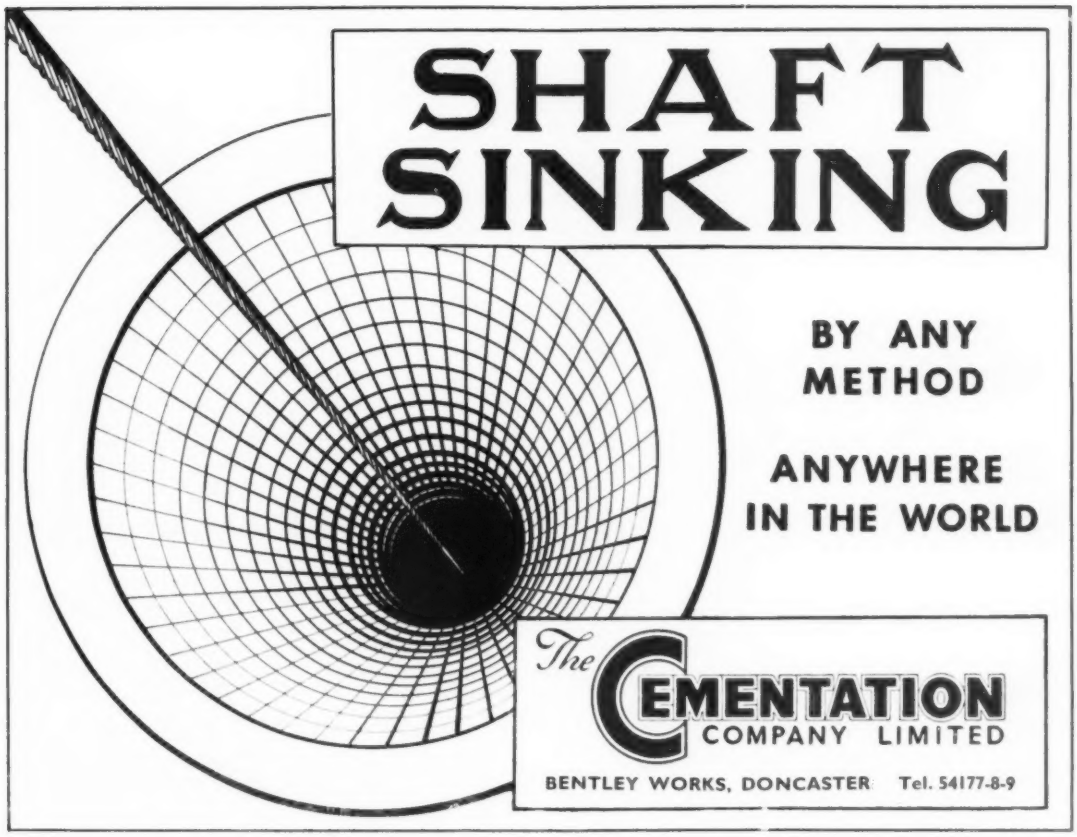
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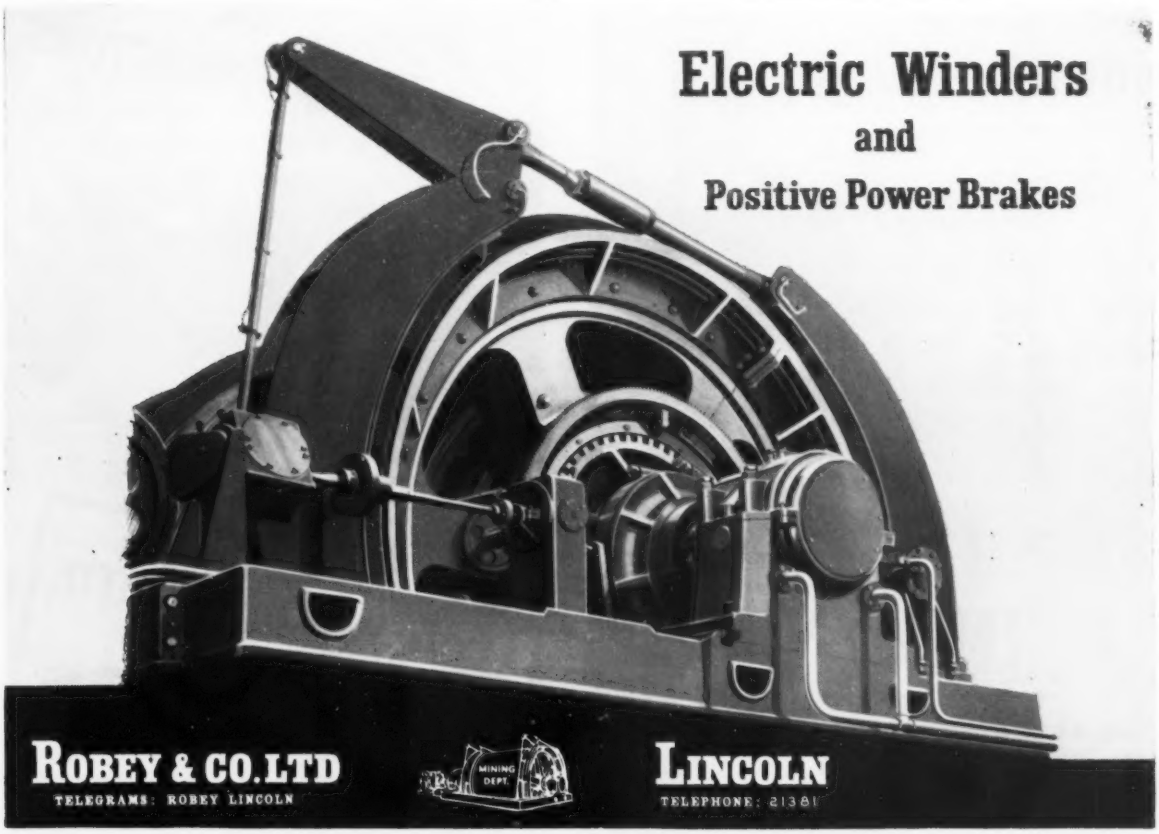
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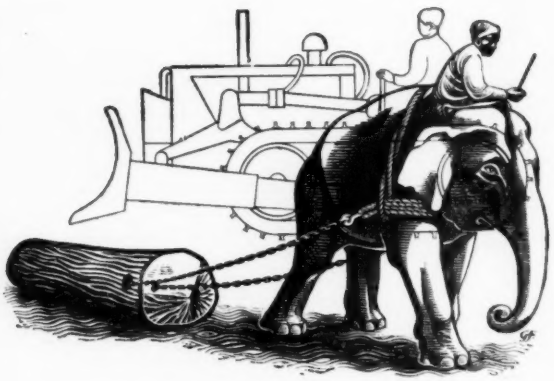

It is impossible to judge from statistics alone how far India's *traditional industries are being reshaped* by Western machines and methods. A first hand experience of Indian life and commerce, like that of the National Bank of India, is needed to put facts into perspective. Enquiries about trade here, or with any other country which is served by the Bank, are welcomed at the Head Office or at any branch.

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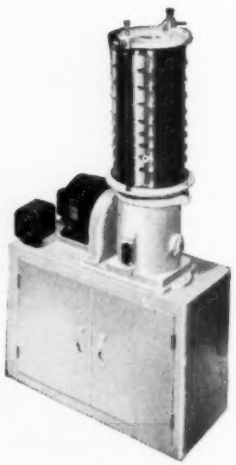

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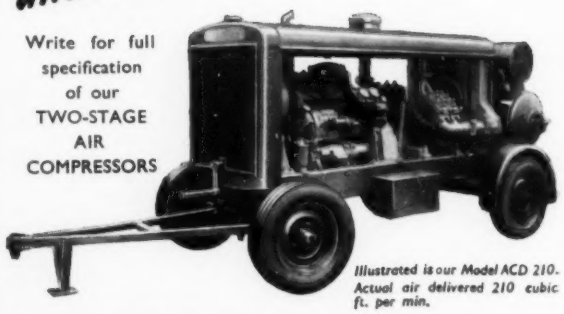

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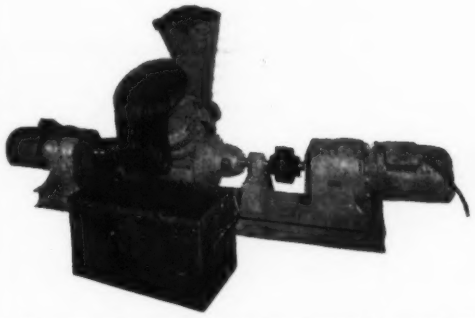

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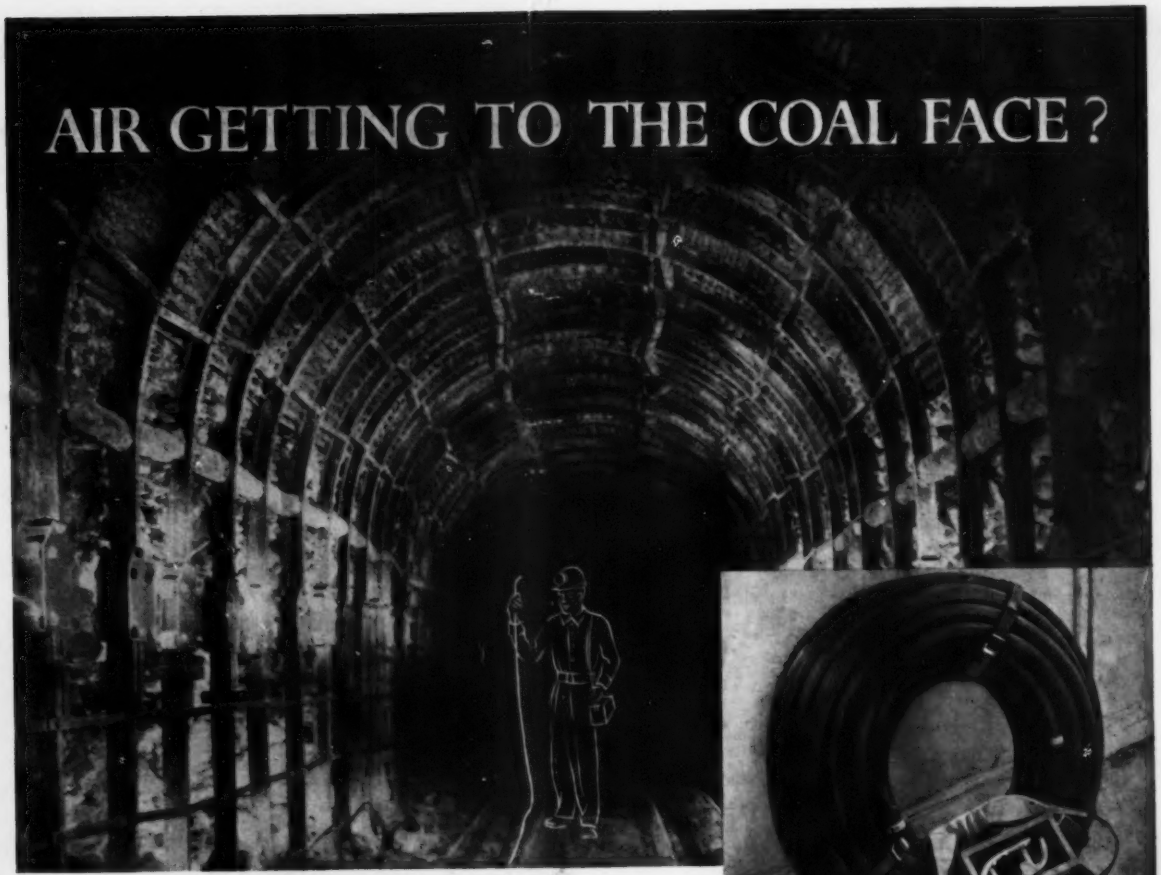

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